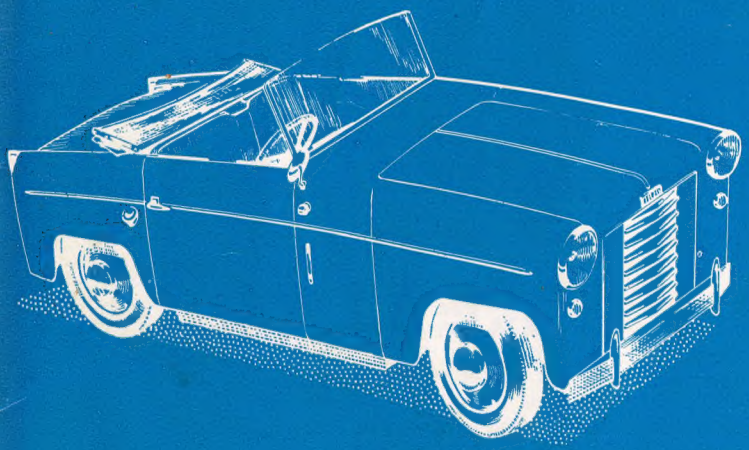
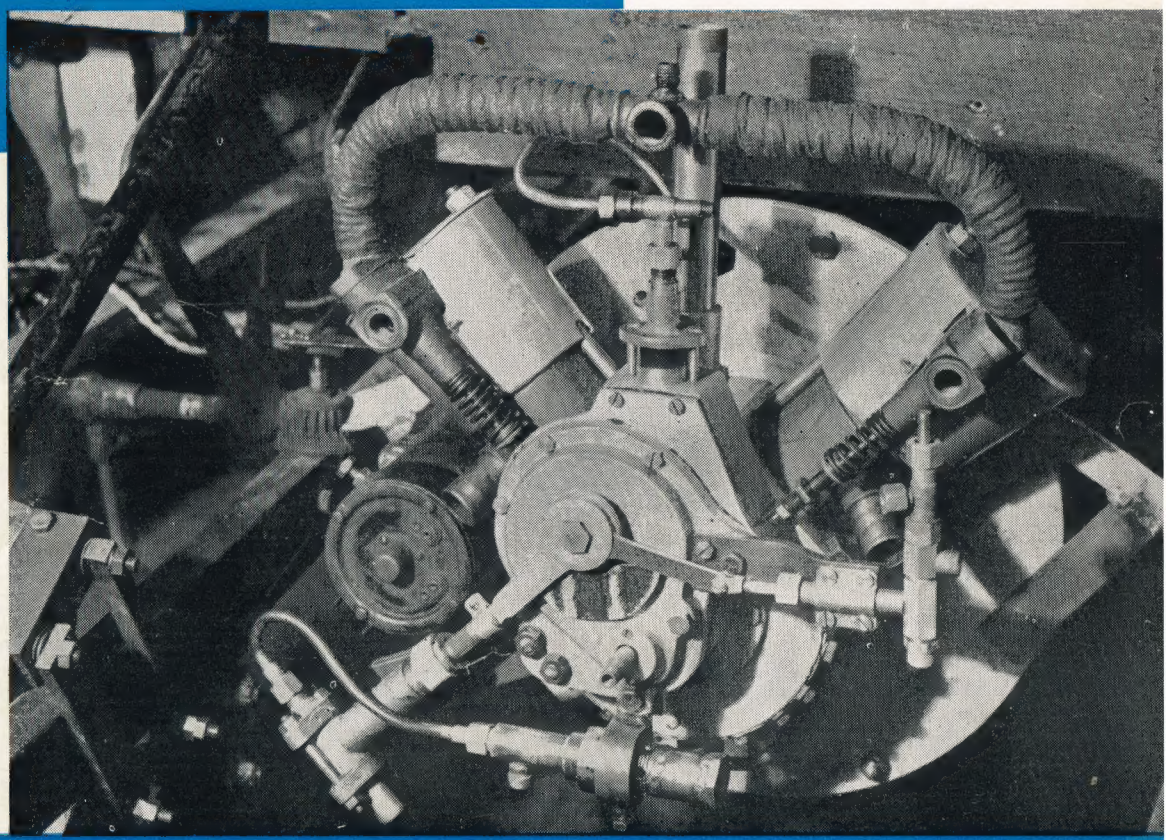
Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED



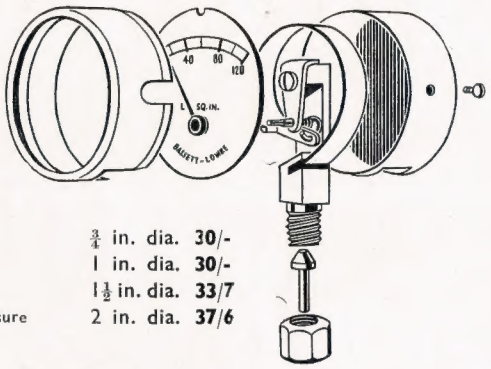
A MODERN STEAM CAR

This home built runabout is described inside



ONE SHILLING 3 OCTOBER 1957 VOL 117 NO 2941

PRESSURE GAUGES for your models



A reliable miniature fitting for practical work in a useful selection of sizes and pressure ranges.

¾ in. or 1 in. diameter. Graduated from 0 to 80, 100, 120 or 150 lb.
1½ in. or 2 in. diameter. Graduated from 0 to 100, 120 or 150 lb.
Made in brass with Bourdon tube action.
Each fitting tested and set individually by skilled gauge-makers.
Well finished with polished and lacquered outer case.
Dials are white with clear graduation and figures. Suitable for all pressure reading purposes.

¾ in. dia. **30/-**
1 in. dia. **30/-**
1½ in. dia. **33/7**
2 in. dia. **37/6**

N.B.—When these gauges are for use on steam boilers they must be mounted with a syphon fitting for ¾ in. gauge, 3s. 7d.; 1 in. gauge, 5s. 4d.; 1¼ in. gauge, 5s. 11d.

Write today to Bassett-Lowke for "Model Shipping and Engineering Catalogue."—Price 2s. 6d.

BASSETT-LOWKE LTD.

18-25 Kingswell Street, NORTHAMPTON

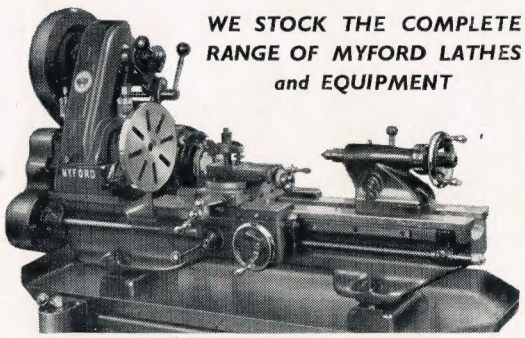
LONDON SHOWROOMS : 112 High Holborn, W.C.1

MANCHESTER SHOWROOMS : 28 Corporation Street, 4

BUCK & RYAN LTD.

TOOLS AND MACHINERY

WE STOCK THE COMPLETE RANGE OF MYFORD LATHES and EQUIPMENT



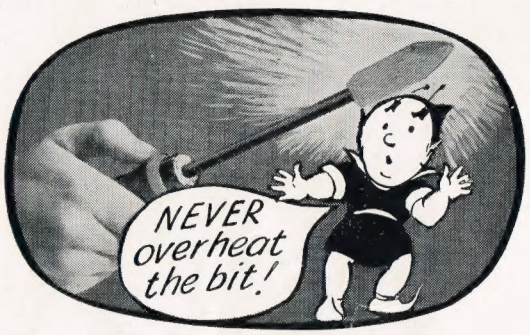
MYFORD ML7 BENCH LATHE £55
(Tray and Motor Extra)

LEAFLETS ON REQUEST *H.P. TERMS*

A WIDE RANGE OF EQUIPMENT FOR THE MODEL ENGINEER ALWAYS IN STOCK

310-312 EUSTON ROAD, LONDON N.W.1
Tel : EUSTON 4061

Follow the **FLUXITE** *way to Easy Soldering*



No. 10 ***Never overheat bit***

Overheating burns away the tinning, spoils the bit and leaves a spongy surface which will have to be refiled and retinned. Be guided by the green flame which appears around the bit as soon as it reaches the right heat.

FLUXITE is the household word for a flux that is famous throughout the world for its absolute reliability. In factory, workshop and in the home FLUXITE has become indispensable. It has no equal. It has been the choice of Government works, leading manufacturers; engineers and mechanics for over 40 years.

FLUXITE
SIMPLIFIES *ALL* SOLDERING

Fluxite Limited, Bermondsey Street, London, S.E.1
GM.60

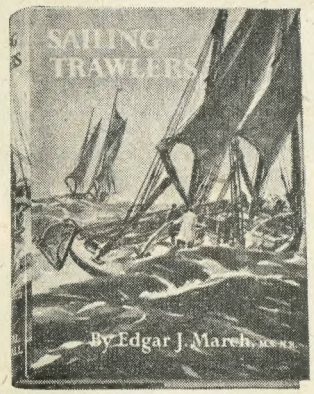
MORE SHIP MODELLING BOOKS

MODELLING THE "REVENGE" *by C. N Millward.* Illus. The author has set out to supply ship modellers with a detailed description of an Elizabethan ship based on careful study of Naval architecture of that period. He believes that precise and detailed knowledge of the actual construction of ships of the period is essential before one can attempt improvisations when constructing models. All who strive after perfection will find this book an essential. A detailed description of hull and rigging construction is given and there are numerous drawings and diagrams. **5s.**, post 3d. (U.S.A. and Canada $1.25, post paid.)

COASTWISE SAIL *by John Anderson.* Thirty years ago our shores and ports were alive with little sailing vessels engaged in our busy coasting trade. Today hardly any purely sailing vessels remain afloat of all that great fleet. In this book the author describes briefly the history, and too often the end, of some 60 of these gallant little ships. Illustrated with 20 pages of art plates. **3s.**, post 3d. (U.S.A. and Canada $1.00, post paid.)

SHIP MODELLERS LOGBOOK *by John N. C. Lewis* 200 pages. A valuable introduction to lightweight ship modelling written especially for the beginner. After providing some essential background information on the various types of museum ship model and the evolution of the sailing ship through the ages, the author gives practical building instructions for a series of models, among them a decorative half model and a sailing model of a Grand Banks fishing schooner. The book is illustrated with many photographs of the models of the ships described and with fourteen accurate scale plans. In addition, there are over one hundred detailed drawings by the author. **7s. 6d.**, post 8d. (U.S.A. and Canada $2.00 post paid).

FLAGS FOR SHIP MODELLERS AND MARINE ARTISTS *by Alec. A. Purves.* The addition of a few suitably selected flags gives a touch of colour and realism to ship models and paintings alike and particularly to the scenic model which is, after all, a three-dimensional picture. But, as with all technical matters, the science of flags is not a simple subject and many pitfalls await the unwary. This book, which has been specially designed to help modellers and artists, also makes fascinating reading for students of history. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00, post paid.)



SAILING TRAWLERS *by Edgar J. March.* Captures for all time a vanished age of sail—the life afloat, the seamanship, the methods of working, the construction and rigs of that vast fleet of sailing trawlers once worked out from the East Coast ports. Fully described hull construction, sail-making, various rigs, etc., with some 181 magnificent photographs—some nearly a century old—and a complete set of drawings of every detail of the Lowestoft trawler, *The Master Hand.* 498 pp. **63s.**, post 1s. (U.S.A. and Canada $12.50, post paid.)

SAILING DRIFTERS *by Edgar J. March.* Huge fleets of sailing drifters once worked out of Yarmouth and Lowestoft, and around the coasts of the British Isles. The construction and rig of these picturesque craft, built to suit the waters in which they fished, are described and illustrated with 60 pages of scale plans, and 76 sketches of gear. 191 photographs. 365 pp. **63s.**, post 1s. (U.S.A. and Canada $12.50, post paid.)

SHIPS IN BOTTLES *by J. P. Lauder and R. H. Biggs.* Describes with the aid of 45 drawings and 8 photographs, the whole method of construction and insertion of a 3-masted sailing clipper and a 4-masted barque, 92 pp. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00, post paid.)

THE HISTORY OF MODEL POWER BOATS *by E. T. Westbury.* The construction and running of model power boats has long been one of the post popular branches of model engineering in this country. The author, who is well known in this and other model engineering activities, has produced a comprehensive history of the model power boat clubs and a very complete study of the evolutions of the model power boat. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00, post paid.)

THE FOUR-MASTED BARQUE *by E. Bowness.* The author is well known to readers of MODEL ENGINEER for his articles on ship modelling and maritime topics. In this book the 4-mast barque, as a type, has been most carefully analysed, and the many variations in form and rig are described and illustrated. Practically any known 4-mast barque can be accurately modelled from this recent book. 128 pages, 88 figures, 44 plates, 3 folding plans. **9s. 6d.**, post 8d. (U.S.A. and Canada $2.25, post paid.)

WATERLINE MODEL LINERS *by C. Swift.* Mr. Swift has prepared a series of beautiful and accurate drawings of modern liners, and this book, with its clear illustrations and carefully written text, explains how to make waterline models of them. **6s.**, post 8d. (U.S.A. and Canada $1.50, post paid.)

MODEL SAILING YACHTS *by W. J. Daniels and H. B. Tucker.* Gives an all-round picture of model yacht racing. Tables of offsets, constructional and operational details for the building of 10-raters, M-class and 36-in. R-class yachts. Methods of building and sailing are explained in a clear and concise style. **10s. 6d.**, post 8d. (U.S.A. and Canada $2.50, post paid.)

BUILD YOURSELF A MODEL YACHT *by W. J. Daniels and H. B. Tucker.* Here are two designs by men famous in the model yachting world, together with complete working instructions and full-size construction plans for a 30-in. Sharpie and 36-in. restricted yacht—guaranteed to sail ! Materials for the Sharpie cost under £3, for the 36-in. under £6. 21 helpful diagrams. 104 pages. Expert advice on sailing of model yachts. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

From your bookseller, or by post by completing Order Form below

M.E. DETACH ALONG DOTTED LINE

POST THIS TODAY

Please supply by return of post

.....
TITLE OF BOOK

.....
TITLE OF BOOK

I enclose remittance value £ : : d.
to cover postage and packing.

To Percival Marshall & Co. Ltd., 19-20, Noel Street, London, W.1

NAME (Mr., Mrs., Miss).....
BLOCK LETTERS PLEASE

ADDRESS.....

.....

.....

(Overseas customers can use an International Money Order)

THE IDEAL COMBINATION

The perfect companion to the ECLIPSE cobalt high speed steel tool bit is the ECLIPSE tool bit holder. Ask for particulars of sizes and patterns.

Made by James Neill & Co. (Sheffield) Ltd., and obtainable from all tool distributors

U.T.7

Model Engineer

ONE SHILLING 3 OCTOBER 1957 VOL. 117 NO 2941

Published every Thursday Subscription 58s. 6d. (USA and Canada $8.50) post free

In this issue

465 Smoke Rings
471 Prince Charles' model
472 St Ninian—20
475 Beginner's workshop
476 Modifications to an EW lathe
479 A 6 pdr Hotchkiss
482 Locos I have known—43
484 LBSC
487 Demonstrations at the Exhibition
489 Spherical turning attachment
491 Myrmidon—10
494 Postbag
497 Readers' queries
498 Jason's notes
499 Club news

Next week

Huddersfield club day

Traction engine rallies: Camborne, North of England, Woburn Park and Elham

Unfinished locos

Swedish State Railways: Page of pictures of their touring centenary exhibition

Unusual locos: The spectacular "camel-back" engines built by Baldwins, of Philadelphia

The Editor is pleased to consider contributions for publication in MODEL ENGINEER. Manuscripts should be accompanied by photographs and/or drawings and should have a stamped addressed envelope for their return if unsuitable. None of the contents of MODEL ENGINEER may be reproduced without written permission. All correspondence should be addressed to the Editor, Model Engineer, 19-20 Noel Street, London, W1.

Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

IT is an incontrovertible fact of life that with the passing of time each of us grows older, never younger. In a business concern, it is inevitable that, in due course, one's older colleagues have to retire in order to make way for younger members of the staff to take over the responsibilities of some prominent executive position.

So far as the ME editorial staff is concerned, the time has now arrived when it is the turn of J. N. Maskelyne to retire after 21 years of service.

J.N.M., as everybody calls him, was no youngster when, in 1936, he accepted the late Percival Marshall's invitation to join our staff. His immediate responsibility then was to take over the editorship of our companion journal, *Model Railway News*, a post he has held ever since.

J. N. Maskelyne

No stranger

But he was no stranger to ME, for he had been a contributor to our pages from time to time since 1923, and he had not been long on our staff before he was undertaking some responsible duties for us. In that capacity, also, he has worked ever since.

I am glad to say that J.N.M.'s great knowledge and experience will still be available both to MRN and to ME, as a consulting editor and also as a contributor. I hope and believe that his pleasant style of writing and beautiful drawing will be pleasing readers of ME for many years.

It may be worth mention, in passing, that J.N.M.'s first major contribution to ME was a reprint of a lecture that he had given not long before to the SMEE. To this day, it is frequently quoted and, in some quarters, is regarded as a classic in its particular field. Its subject was "A Sense of Proportion and its Influence upon Model Locomotive Design and Performance."

Smoke Rings . . .

Scale models

What a mouthful ! But note that, like almost everything that J.N.M. has ever said or done in public, it was concerned with locomotives.

However, his interests are not wholly concerned with locomotives; he has always been keen on models, *as models*, and of all kinds. The nearer to scale they are the better he likes them, and he has spent a great deal of his life studying the fundamental problems involved in making *scale* models that work properly. This subject has, for many years, been the underlying theme of lectures he has given to different societies and clubs in England, Scotland and Wales.

One of his favourite jobs has been the task of judging the entries in competitions at model engineering exhibitions all over the country. This has sometimes presented him with some real posers; for instance, on one occasion, after a particularly difficult session of judging, he found himself faced with having to decide whether a doll's house or a beam engine was " the best model in the show." He says that both models were so good that the only way he could make a decision was to toss up a coin; the beam engine won !

This kind of thing has added immensely to his enjoyment of his long association with model makers and their work; he was moved when, some twelve months ago, the SMEE bestowed on him the distinction of honorary membership.

Steam on the Underground

PASSENGERS in their Sunday best waiting for an inner circle train on London's Underground, which has been electrified for 52 years, were astonished recently to see a steam train packed with 600 people come chugging through the tunnels.

They were witnessing the special trip organised by the Stephenson Locomotive Society in co-operation with London Transport.

The train, hauled by L.46 tank in the peculiar maroon-mauve livery of London Transport's steam stock, comprised compartment coaches normally operating on the Aylesbury branch some of which date back to the year of electrification, 1905.

Charge for the round trip per head was 8s., which, say London Transport, covered the cost without profit.

How come that London Transport operate steam engines when their system has been electrified for over 50 years ? Well, generally the L-type tanks lead a nocturnal life based at Neasden where they perform shunting and goods duties and operate maintenance and breakdown trains during the few hours at night when current is cut off.

Rainbow phenomenon

DID any of you notice the particularly brilliant rainbow which decorated the skies of Western London one evening last month ?

I had a good opportunity to observe it for some minutes and I saw, as I have seen on one or two occasions previously, that there were, indeed, two rainbows, one above the other, one being a reversal and very much brighter than the other.

I saw, too, that the area of sky enclosed between the two rainbow bands was a shade or two darker than the sky on the outside of the two spectra.

What is the reason for this ? I have heard it said that there are colours of which the human eye is ignorant. Could it be that this darker band is composed of these unknown colours but our eyes merely see them as a uniform grey ? Or is it a band of frequencies—such as infra-red and ultra-violet—which border on visible light and the eye of homo sapiens translates it to a dull grey ?

Evening learning

BY now many of our junior readers, and perhaps several of the older ones as well, have enrolled at evening institutes up and down the country with the object of furthering their engineering studies during the autumn and winter evenings.

Almost every locality in the country is now served by these institutes, but if you are in doubt about your own area the best plan would be to contact the local council offices.

Generally speaking, county councils issue pamphlets detailing the several study courses open to applicants, and it is surprising sometimes what a multifarious selection is available.

I notice, for example, from the LCC handout " A Londoner's Opportunity to Study," which can be obtained free from the Education Officer, The County Hall, Westminster Bridge, SE1, that pupils may obtain tuition in such diverse subjects as sculpture, lino laying, sanitation, dietetics, lingerie, gas salesmanship and pyjama making.

The " Royal George "

WHEN I asked here on September 5 for a book on the *Royal George*, needed by a reader in California, I guessed that we should hear something from someone sooner or later. In fact, we hear sooner !

A reader in Somerset immediately sent me a letter saying that he had in his possession a set of three volumes by F. Whymper on adventures, disasters and battles at sea. The books were published in 1880 and one of them contains a first-hand account of the terrible day at Spithead

When Kempenfelt went down
With twice four hundred men.

This is kind of our Somerset reader. But his kindness does not end here. He offers to lend the three volumes to the reader in California and to pay postage across—adding that Whymper's pages give a good deal of American sea history including the actions in the Civil War.

I would also point to a coincidence. As readers of my earlier note (" Toll for the Brave ") may remember, the tiny wood-bound narrative in the National Maritime Museum at Greenwich was published by S. Horsey, of Portsea. The reader in Somerset is G. Horsey, of Clevedon.

The hat-trickers

MY paragraph announcing the bronze medal hat trick which S. A. Walter, of Wembley, achieved by securing an award in this year's Model Engineer Exhibition, brought a letter from C. B. Reeve, of Hastings, the constructor of many excellent clocks, and a well-known contributor to this magazine.

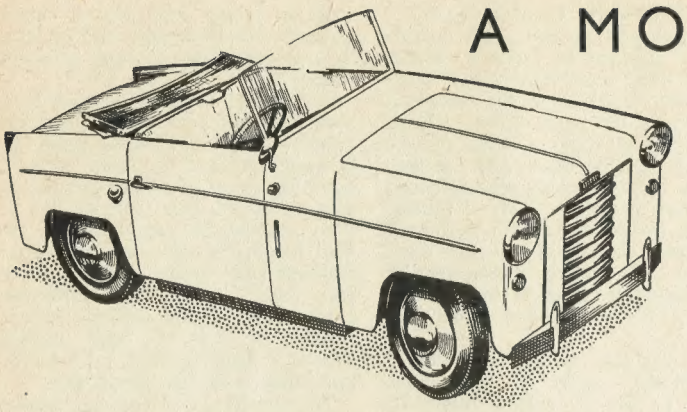
Altogether, in the period since 1936, Mr Reeve has won nine senior awards and three times has come within an ace of achieving the hat trick. Look at this impressive list: 1936 bronze medal; 1937 silver medal; 1938 silver medal; 1946 bronze medal; 1947 silver medal; 1948 silver medal; 1950 championship cup; 1951 silver medal and 1952 silver medal and Bradbury Winter cup.

Had he won silver medals in 1939, 1949 and 1953 he would have scored hat tricks. Moreover, had he been awarded a silver instead of a bronze in 1936 that would have been three of one kind in a run.

Nevertheless, I think that by securing bronze and silver medals in 1936, 1937 and 1938 we can elevate him to the select band of hat-trickers. What do you say, Mr Walter ?

Cover picture

An artist's impression of the modern steam car described by H. Claydon on pages 467 *to* 470. *Below the drawing is a photograph of the steam-driven power unit*



A MODERN STEAM CAR

This attractive vehicle was designed and built by H. CLAYDON. Here he presents constructional details, with a few thoughts on the possibilities of future development

THE design of the power unit about to be described is the result of a considerable amount of experiment with a number of engines, both steam and i.c., which I have built up from time to time. It always seemed that the conventional type of steam engine, with either slide or piston valves, was entirely unsuited to road vehicle work, where the efficiency of the plant must be as high as possible to cut down weight, fuel and water consumption.

With this in mind, I decided to build a Uniflow engine, the design of which was largely influenced by modern petrol engine developments. This type of engine will perform well on quite a moderate steam temperature, so that a straight type of mineral lubricating oil can be used for both pistons and bearings, eliminating the need for a "high superheat" steam cylinder oil which soon chokes up boiler tubes and condenser.

The design was further influenced by the fact that the engine was to be built with the aid of a Myford 3½ in. lathe. Cylinder liners (Fiat 500 c.c. replacement type) were first obtained from the motor factors. These were pressed into the outer cylinder shells (Fig. 1), then sent back for honing.

Aluminium alloy pistons were then cast from a wood pattern and core-box, as ordinary motor pistons have a split skirt and would not control the exhaust ports drilled in the wall of the liners. An oil scraper ring was fitted to the bottom of the piston to prevent excessive oil consumption through the exhaust, and it is interesting to note that the exhaust ports act as cylinder drains, which means that the engine can be started from cold without first "blowing through" with steam. The exhaust hose pipes also have a downward slope to the feed-heater drum situated under the radiator-type condenser (see Fig. 5).

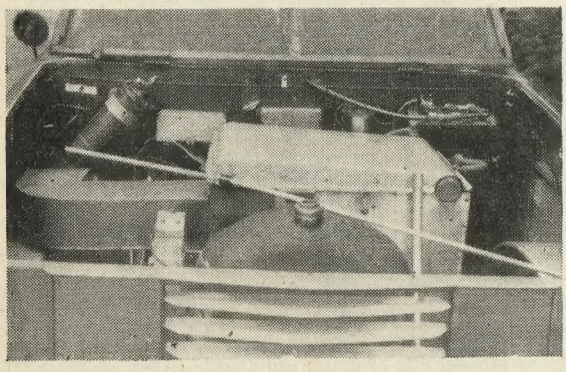
The single-throw crankshaft was built up in motor-cycle fashion from ⅛ in. bright mild steel, the webs being cut from 1½ in. × ½ in. black bar. This was preferred to the cold-rolled type of material, which tends to distort after machining. Skefco roller bearings were fitted to the main journals, which were made as long as possible to give added stiffness to the complete assembly.

Connecting-rods were cast in light alloy from my wooden pattern to the approved I-section, a Skefco roller bearing being pressed into each big-end while it was heated to approximately 212 deg. F. This was to prevent their working loose at the operating temperature. Bronze bushes for the small-ends were then reamered to fit Fiat gudgeon pins which are fully floating and secured to the pistons by circlips.

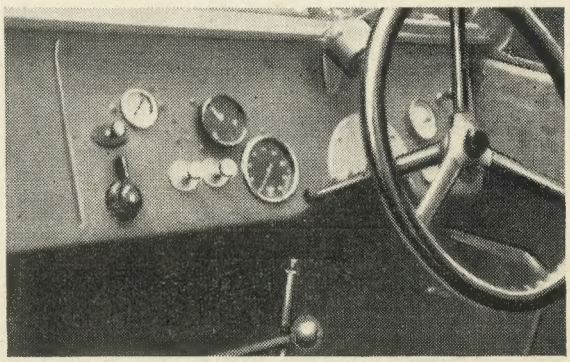
Crankcase machining was carried out on the Myford without much difficulty as it was built up in sections, the two end covers being 6⅞ in. dia. with the top part cut away at right angles for bolting on to two thick plates of cast aluminium; these form a substantial base for bolting down the cylinder heads and liners.

A 16 in. dia. ½ in. thick disc of cast aluminium was machined on a friend's large lathe for attachment to the Singer three-speed gearbox bell housing, the crankcase being attached to this by a heavily-webbed main bearing housing. The bottom and sides of the crankcase were covered in with a 16-gauge sheet of dural attached with closely-spaced Allen screws. All joints were sealed up with Osotite gasket compound.

Lubrication was by splash, the



View from front, looking over radiator



The dashboard and instrumentation

level of oil being maintained by the small pump seen on top of the gear-case. This has recently been modified, as this pump was originally intended to inject oil into the steam pipe. But as this was found unnecessary, it has now been connected to the gear-case where the oil works its way through the bearings into the crank chamber.

This pump (shown in section in Fig. 2) works at 1/20 engine speed; the barrel is adjustable for height to vary the output. The effective stroke can be adjusted from zero to $\frac{1}{8}$ in.—the plunger being $\frac{1}{8}$ in. dia.—and a spring-loaded ball valve is inserted in the delivery pipe-line to register 200 lb. on the gauge on the dash-board.

The vertical tube seen behind the steam pipe (Fig. 3) is the crankcase breather, on top of which is screwed an air-cleaner (not shown). This ventilation is necessary for getting rid of water in the bearings of a single-acting engine—and the heat conducted from the exhaust jackets to the bear-ings is a great help in this respect.

In spite of these arrangements a little water collects in cold weather, and is drained off by a cock about every 50 miles; at the same time oil is topped up through the breather pipe, the level being checked by a dipstick.

A single cam operates the two stainless-steel poppet valves. It has convex flanks for silent running, giving a valve lift of 3/32 in.—admission being 15 deg. BDC and cut-off 20 deg. operating through flat-based mushroom tappets. The cam lobe was built up by electric arc welding, being ground, case-hardened and polished, and finally bored and keyed to fit the crankshaft.

Referring to Fig. 3, the starter motor, which has been retained on this gearbox, can be seen to the left, and below this the feed pump working off the same crank as the fuel pump on the right. This feed pump was not a success, however, as the gland needed frequent attention, and the single ram caused severe "water hammer." There-fore, a four-ram pump was built as a separate unit and driven by chain from a sprocket mounted in place of the crank, a small pin with ball-bearing attached being screwed into the sprocket to connect with fuel-pump con rod.

The new feed pump has $\frac{1}{2}$ in. dia. rams with a stroke of $\frac{5}{16}$ in.; the eccentric rods are 15 in. long, so that with the extra-long glands now fitted, wear is practically nil. Valve boxes follow normal model engine practice, and are connected together like a diesel fuel injector with a gallery.

THE STEAM GENERATOR

Turning now to the boiler depart-ment, I decided to build a smaller edition of the water-tube type reported to be very successful in the American steamers of the early 1930s. These, however, had quite a large reserve capacity, holding about eight gallons whereas mine will only contain about one quart in all the 180 ft of tubing. This is, no doubt, due to the small bore and the rapid rate of heat transfer. The oblong shape enables the maximum amount of heating surface to be crammed under the bonnet.

Fig. 4 shows the 100 horizontal wrought-iron tubes of $\frac{1}{2}$ in. bore welded to the 20 vertical tubes of $\frac{3}{4}$ in. bore, ten of these being connected to the steam and water headers at top and bottom. In addition, 60 ft of Tungum alloy tube is arranged in grid formation over the top and down one side, where the exhaust gases are led down through a duct under the chassis; this is the "economiser," and is connected to discharge into the bottom header or mud drum, where the feed water has by this time reached a high temperature. It deposits its scale as sludge, and here it can be blown off periodically, leaving more or less pure water to enter the main tube grids.

The whole assembly is encased in sheet asbestos covered with aluminium panels. A small separate panel can be easily removed to expose 20 wash-out plugs, two of which can just be seen by the 1 ft rule (Fig. 4).

A superheater composed of two 10 ft lengths of $\frac{3}{8}$ in. o.d. cold-drawn seamless steel tube is inserted in the gap seen between the horizontal cross tubes. Total effective heating surface is 25 sq. ft, and working pressure varies from 275 to 450 lb., according to driving conditions.

The throttle valve (poppet type) is mounted on the end of the top steam header. The steam is then passed via the superheater to the scale trap before it enters the engine steam chest. A small release valve is fitted at the bottom of this trap and operated by Bowden cable from the dashboard each time on starting from cold, thus releasing any water and warming up the pipe. A safety valve is mounted adjacent to the throttle, set to blow off at 600 lb. into the feed-heater

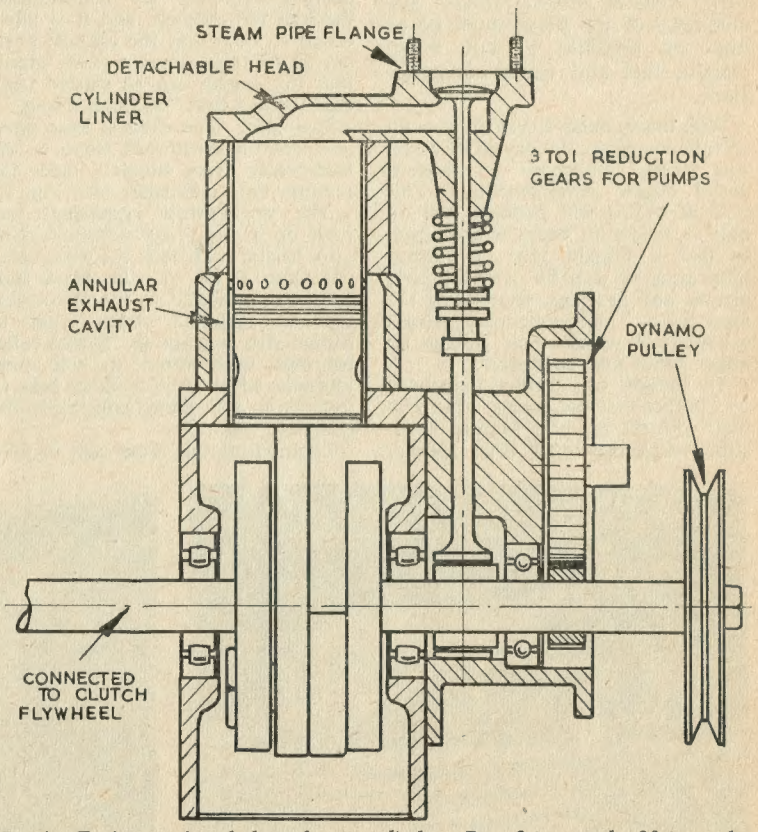


Fig. 1: Engine sectioned through one cylinder. Bore 2 in., stroke 2⅜ in., valve heads ⅝ in. dia., stems 7/32 in. dia.

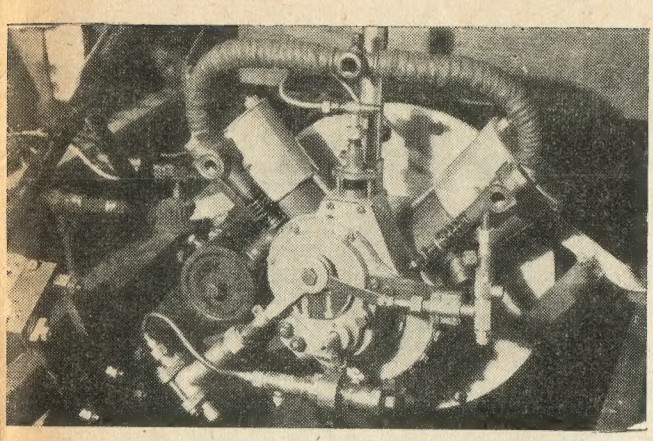


Fig. 3: *Front view of the V-twin Uniflow engine*

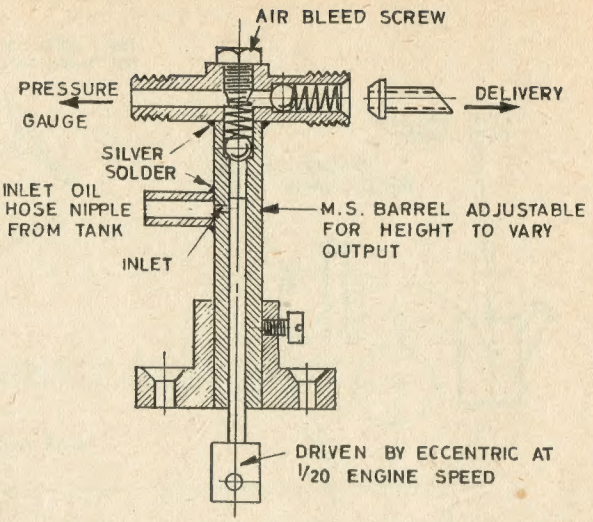


Fig. 2: *The engine lubricator pump*

drum, thus silencing the discharge.

An outside water column is connected to the steam and water headers. This keeps cool and shows a water level which is controlled by a Stanley-type water level regulator consisting of a copper element which expands or contracts according to the amount of water or steam contained in it. This in turn operates the feed by-pass valve, thus controlling the temperature of the steam leaving the throttle, and is so adjusted to produce a slight superheat at the throttle in order to get a snappy control of engine output.

The car can be started from cold within four minutes after switching on the burner and driven away at full pressure, no hand pumping of any sort being necessary.

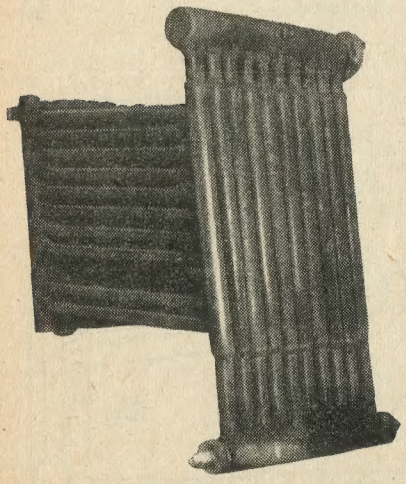


Fig. 4: *Water-tube boiler removed from its casing*

THE ATOMISING BURNER

Figs 5 and 6 show the atomising burner attached to the side of the generator, with the blower set at a tangent to the mixing chamber to create a swirling motion and so thoroughly mix the air with the spray from the jet. The blower is a Sirocco-type, giving a static air pressure of 1½ in. water at 3,000 r.p.m.; the motor is a converted rotary converter consuming five amps at six volts.

The jet nozzle is a pressure-atomising type as used for many industrial purposes, but with the addition of a jet needle to give instant cut-off of fuel when the steam pressure reaches 450 lb. Blower motor, spark coil and jet needle are all connected to a micro-switch—which in turn is operated by a diaphragm pressurestat control seen on the bulkhead next to the fuel-pressure tank set at an angle of 45 deg. (Fig. 7). Pressure in this tank is kept constant at 35 lb. by another diaphragm control unit at the near-side of the bulkhead (not shown). Maximum consumption of fuel, whether petrol, paraffin or other light fuel oil, is 1½ gallons per hour.

The spark plug has extended stainless-steel electrodes which protrude though one of the holes in the perforated flame tube (Fig. 6) close to the nozzle where the mixture is rich, and gives instant ignition whether cold or hot. The spark coil is automatically cut out when the blower motor has reached full speed by a centrifugal switch attached to the motor shaft.

The gap at the plug points is 3/32 in., and to get a hot enough spark with this small gap the model T Ford trembler coil had to be modified by fitting Lucas contact-points and weighting the trembler blade to reduce the period of vibration. A larger gap at the plug tends to cause the spark to leak off elsewhere in damp weather; also a considerable amount of moisture is liberated by the combustion of the fuel when first starting from cold.

BENCH TESTS

Many months were spent experimenting on the burner with an open firebox before it was finally fitted to the generator; the complete plant was erected on a test bed consisting of a friction dynamometer and revolution counter. Four to eight b.h.p. was recorded at 2,000 r.p.m., and as the engine was new with the pistons running a bit tight, I considered this a satisfactory performance.

During these tests, a number of teething troubles were dealt with—such as oil leaking through the main bearings, uncertain fuel pressure from the pump, vibration in the engine and fierceness in throttle control. The latter was rectified by a slow-start cam operating the throttle poppet valve.

Subsequent road trials revealed more defects, among them frequent piston seizure on long steep hills. This was found to be due to insufficient clearance and distortion, but has now been corrected. Valve steams also showed a tendency to stick up for the same reason, a clearance of 1½ thou being necessary.

Two thousand miles were covered before the engine showed any signs of being run-in, which seems to prove the theory that a steam engine is subject to much less wear than its i.c.

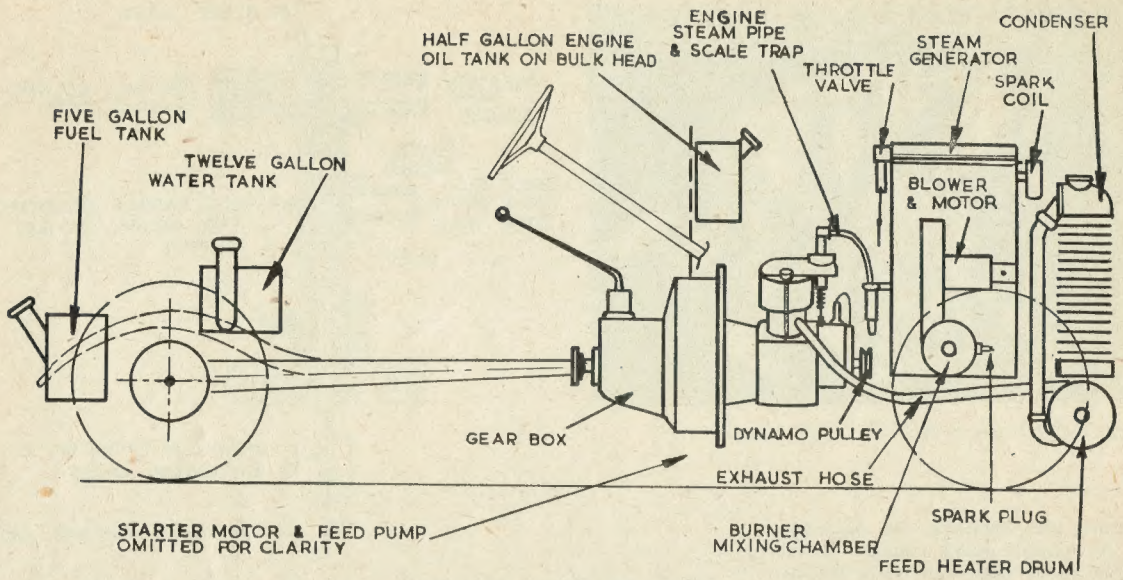


Fig. 5: General chassis layout

rival. The piston skirts develop a very high polish in service.

Fuel consumption works out at 20 m.p.g. on town driving to 28 m.p.g. on long distance runs. Water consumption varies from 10 to 20 m.p.g. according to weather conditions, while the lubricator pump is set to deliver approximately one gallon per 800 miles. Draining the crankcase revealed no oil contamination as found in an i.c. engine.

FUTURE DEVELOPMENT

The performance still leaves much to be desired, as it is not possible to exceed a cruising speed of 30 m.p.h., while 40 m.p.h. can only be held for short distances.

With a view to improving on this performance without increasing fuel or battery consumption, an improved generator and burner will be designed together with a four-cylinder 90 deg. V Uniflow engine capable of 5,000 to 6,000 r.p.m. at a working pressure of 650 lb.

Air for combustion will be preheated from the flue gases, thus utilising a lot of heat which is now being wasted.

This engine would have a bore of 40 mm. and a stroke of 50 mm., and with carefully-designed valve gear should be no more noisy than a good electric motor. It would also be self-starting, eliminating the need for a starter motor or clutch. (The latter would only be used for changing gear on a very steep hill.)

A separate camshaft would be used to give a variation in cut off from 15 per cent at high revolutions to 70 per cent at starting. Exhaust steam would be led through a jacket on an oil sump base to vaporise any water collecting at this point. After some bench tests on a modified unit, it is hoped in a future article to present a full description, with illustrations of the various components during assembly.

Acknowledgment is made to *Light Steam Power* for the pictures reproduced. ▣

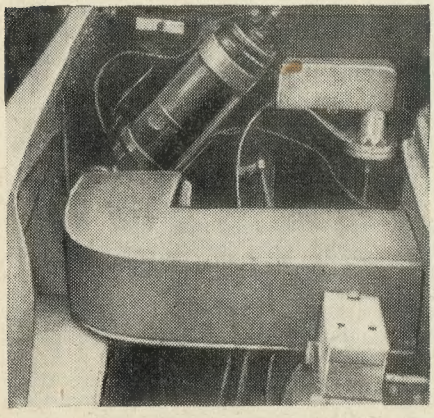


Fig. 7: Fuel pressure tank and pressurestat control on the bulkhead

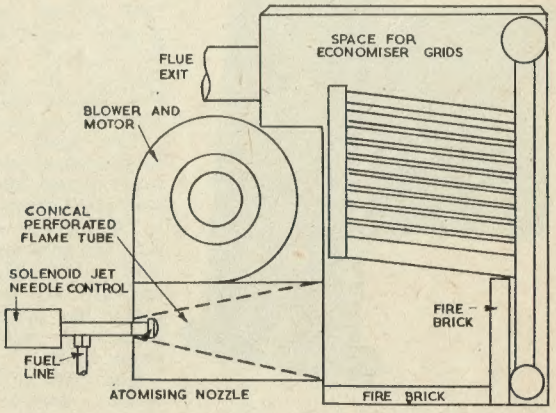
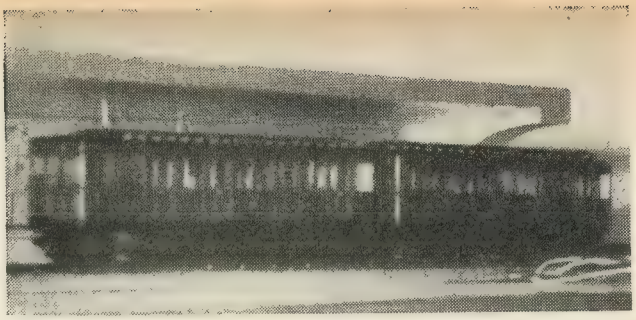


Fig. 6: Diagram of generator and burner

That METRO MODEL



The letter we publish below contains much criticism of Prince Charles's gift. Do you agree with the sentiments expressed? We asked one of our technicians to describe the model and add his own comments

I HAVE just returned from this year's Model Engineer Exhibition and I am writing to you while my impressions are still fresh in my mind.

First. as one of the least expert of the visitors, I would like to pay tribute to the quality of the models; some of them were really wonderful. Moreover, it was most encouraging to see the number of exhibits that were well within the capabilities of the average model engineer.

But the real burden of my letter is to say how disappointed I was with the model of the Paris Metro which was presented to Prince Charles when the Queen visited France recently. I appreciate that it was a toy and, because of its special association, was interesting to have on public view; but nevertheless I thought it compared very badly with many of the other exhibits. If this is Prince Charles's introduction to model trains I think it a pity that a more interesting circuit was not devised. I am convinced that British craftsmen would have produced a far worthier piece of work.

Of the fact that it was apparently some days before the trains worked at all I will say little. I cannot say that I am surprised, as from what I saw of the circuit it seemed to leave something to be desired. But I should be interested to have a more expert opinion of the set.

Kingston-on-Thames. J B. BAILEY.

● The 1/43 scale model consists of motor and trailing coaches, two stations and an oval of track. The cast bronze coaches are mounted on fabricated brass bogies, the leading one under the motor coach incorporating a Baveret electro-magnet motor to operate on 20 v. a.c. Rolling stock and stations are illuminated by 16 v. a.c. pea bulbs.

Confusion over the French noun *la porte*—door or gate—lead to the early statement that the stock had operating doors, when in fact both stations follow prototype practice of having crush gates shutting off public entrances. On the model these are controlled by solenoids which are actuated by a 20 v. a.c. supply.

The system of circuits employed is more complicated than usually adopted by railway modellers, and in the absence of a wiring chart and data, the exact method used could not be determined without completely stripping the model and, therefore, remains something of a mystery.

It would appear that traction current is supplied from a 40 watts transformer/controller to an outside third rail, this rail also supplying momentary current to actuate gate solenoids when the collector-shoe touches the brass strips (about 4 in. long) placed ½ mm. away from the live rail at entrances and exits to stations. A running rail is a common return for both these circuits, and that providing lighting for stations and rolling stock.

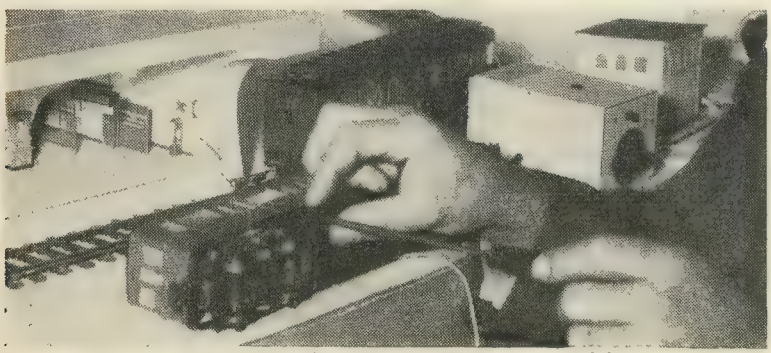
Current for the latter two services is supplied by a 60 watts transformer at 16 v. a.c. through the other running rail. Running rails are bonded by fish plates and the outside third rail by bayonet plugs and terminals let into the track bed. Sleepers are wooden and placed about two to the inch.

Even without first-hand knowledge, railway modellers will be aware of the fact that an exhibition hall and —dare I say it ?—close proximity to a live steam track are not the best circumstances in which to overcome current collection problems owing to dirty track. In addition to track cleaning, including the removal of excessive track paint, steps had to be taken to ensure good operation. The brass brushes making contact with the running rails had to be replaced owing to wear, and the outside-third collector shoe resprung and extended.

Before the Exhibition the model was transported to the Royal Palace in Scotland, and obviously during the course of this and the return journey the otherwise adequately packed model must have experienced considerable vibration. The 60 watts transformer had completely shorn its bearing in the metal replica of a power house in which it is placed, so that it resembled a baby's rattle. Another defect attributed to vibration—and one which resulted in a principal headache—was a commutator lead that had parted from its terminal.

The standard of modelling is good, and a number of visitors to the Exhibition made inquiries about the plastic tiling with which the stations are lined. I would have preferred a more positive track bonding, and would have chosen a simpler system of wiring. Instead of the thin brass strip solenoid contacts I would most certainly have made use of a short piece of the brass T-section from which the outside third rail is made, and a broader collector shoe to make contact. For though this would be non-prototype a more robust finish would have resulted.

Finally, like most railway modellers I prefer to see the green flex on power leads—mother earth !—R. E. DOCK. ■



An emergency repair being executed during the Exhibition

A WORKING MODEL OF
ST NINIAN

By EDWARD BOWNESS

Part 20—Now for those outstanding deck details! In this instalment the author illustrates how best to incorporate them

Continued from 19 September 1957, pages 405 to 407

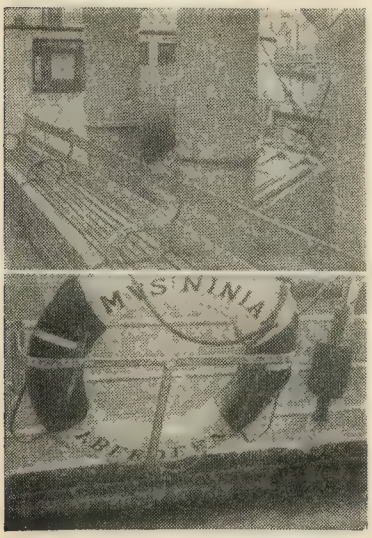
THE model is now nearing completion. But it is surprising how many loose ends there are to gather up when one reaches this stage.

There have been a few re-arrangements since the ship was built, especially with the disposition of the seats. I think the model should be built to resemble the ship in her present condition—except for the modifications caused by my early decision to ignore the new deckhouse at the after end of the boat deck.

To make things perfectly clear and to amplify the information given in the deck plans in the general arrangement drawing (pages 96-7, January 17), I have prepared a plan of the boat deck and the wheelhouse top (Fig. 90) and of the docking bridge (Fig. 91) on which the positions of the various fittings are indicated.

THE RAILS

The rails on the midship superstructure still remain to be fitted.



Top: Buoyancy seat. Note hinged end frames to back. Below: Close-up of lifebelt showing cradle and floating light

For those around the promenade deck, stanchions as shown in Fig. 51*C* (May 16) will be needed. The wooden rail must be notched on the inside to clear the tracks for the davits for the four after boats and, after pressing it firmly on to its stanchions, it must be cemented to the tracks, at the ends and at all joints.

The rail around the boat deck is similar, except that it is interrupted between the tracks of each set of davits. In the rail between the tracks the teak top rail is replaced by an iron one, as will be seen in the picture on page 845 (June 13) and in Fig. 90. The teak rail is, of course, continued along the top of the bulwarks.

The rails along the wings of the bridge may be seen in the illustrations on page 630 (May 2). The hinged docking platform is shown hinged down in the picture on the left, and closed in that on the right. Although provision was made for having it hinged (see Figs 43 and 44, May 2) I think, on reflection, it would be better in a working model to make it a fixture. The double rail on the left is the gate between the boat deck and the bridge, which was open when the picture was taken.

This rail is continued around the bridge to the side of the wheelhouse. From the corner of the side light platform to the wheelhouse a wind deflector is fitted, as will be seen in the illustration on the left on page 630 (May 2). This consists of a strip of metal about 15 in. deep fixed a few inches in front of and below the teak rail and curved outward along its upper edge (Fig. 92). It may also be seen on page 774 (May 30).

The rails between each pair of davits are supported by four stanchions, the outer ends of the rods being fixed to the uprights of the tracks. The top rail is thicker than the lower ones, so the builder should allow for this when making the additional form tool which will be required for turning the stanchions with the extra ball.

There are no railings on the top of the wheelhouse except those which form the upper bridge. These are shown in Fig. 90 and in the picture on page 844 (June 13). These require two-ball stanchions and could be made with the new form tool, and the unwanted balls filed or turned off them.

There is a short ladder on the starboard side of the wheelhouse from the wing of the bridge to the entrance of the upper bridge; also two ladders on the curved front of the superstructure from the shelter deck to the bridge. These are shown in Fig. 90 and in the arrangement drawing on pages 96-7 (January 17) and should be made of wire similar to those up the sides of the masts.

STANDARD COMPASS

Two standard compasses will be required, one for the upper bridge on top of the wheelhouse and the other for the docking bridge. Their principal lines are given in Fig. 93 and their general appearance is shown in the picture on page 844 (June 13).

The central pillar should be turned from a brass rod $\frac{1}{4}$ in. square and the brackets for the spheres should be turned from a brass rod $\frac{1}{4}$ in. square and the brackets for the spheres soldered on. The glass window at the top could be represented by a piece of Perspex scalloped out to fit the cone and then cemented in position. The same picture shows the direction finder very clearly.

The height to the centre of the rings should be about 1.2 in. above the deck and the diameter of the outer ring about 0.7 in. The post for the Morse Lamp is also shown. This could be made from a piece of 12 s.w.g. brass wire with a bead of glass or Perspex on the top. The lamp is 9 or 10 ft, above the deck—say 2 in. in the model—and there is a light stay aft from about 7 ft up.

ENGINE-ROOM TELEGRAPH

The engine-room telegraphs and the docking telegraphs are very similar to each other, the only difference being in the lettering on the dial, which in any case is too small for reproduction at our scale.

Five are required—two on each side on the wings of the bridge—and one on the docking bridge. Fig. 94 gives the main dimensions and the picture on page 774 (May 30) shows the appearance of the head. This is turned from $\frac{5}{16}$ in. brass bar and the pillar from $\frac{1}{4}$ in. bar.

Note that the two inner instruments on the bridge have two indicating handles and two dials each whereas the remaining three have only one handle each.

MASTHEAD AND SIDE LIGHTS

In accordance with the official regulations *St Ninian* carries two masthead lights, one on the foremast

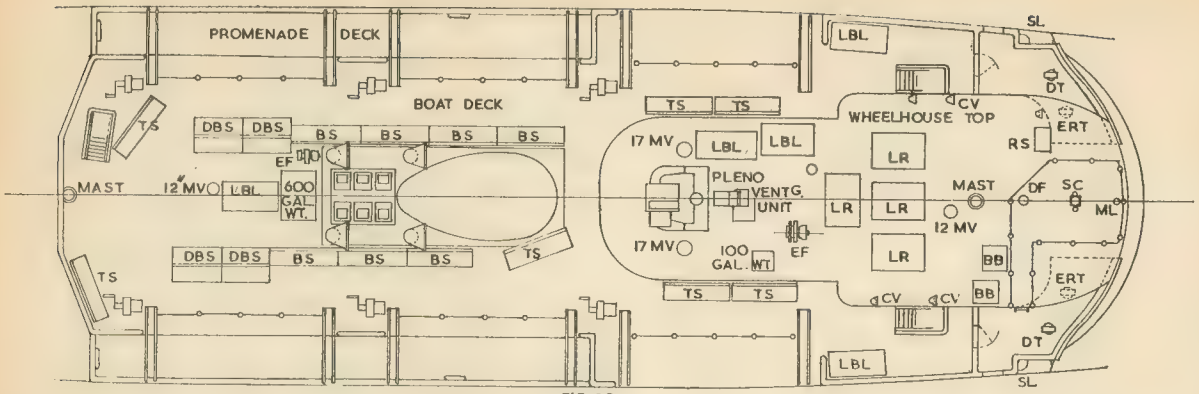


FIG 90

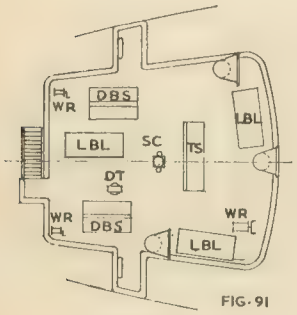


FIG. 91

Left and above, Fig. 92: *Wind deflector on bridge (shown in section). Fig.* 93: *Standard compass. Fig.* 94: *Engine-room and docking telegraphs. Fig.* 95: *Head light* A *and side lights* B. *Fig.* 96: *Water tank. Fig.* 97: *Teak seat. Fig.* 98: *Buoyancy seat. Fig.* 99: *Double buoyancy seat. Fig.* 100: *Life rafts. Fig.* 101: *Lifebelt locker*

at the lower mast band and one on the main mast at the upper mast band. These rest on the platform provided for them, and should be made as shown in Fig. 95*A*. The builder's drawing shows a second lamp underneath each of these platforms with means for hauling it up into position. These are presumably the oil lamps kept in reserve in case the electric lights fail, but need not be included in the model.

The side lights are shown in Fig. 95*B* and, again, may be seen in the picture on page 630 (May 2). They are made in two sections, one above the other, the upper one being separate and resting on a little shelf. They could be turned from Perspex. The glass portion should be tinted the appropriate colours—red for port and green for starboard—the brass housing above and below the glass being tinted a brownish yellow to suit.

The little deflector plate in front, which obscures the beam for 10 deg. from directly forward, should not be overlooked. Tiny electric bulbs could be substituted for the Perspex in the head and side lights, and also for the Morse Light, if desired.

WATER TANKS

There are two water tanks, one, a large container of 600 gallons' capacity, on the boat deck aft of the engine-room skylight, and the other, of 100 gallons' capacity, on the roof of the wheelhouse. These are of the usual circular type with flat ends.

They can be built up in tin-plate quite easily or the drum could be made in wood and the ends of thin three-ply glued on. the whole then being glued to the deck. Their general dimensions are given in Fig. 96.

THE LIFEBELTS

Lifebelts are provided at convenient and prominent places around the ship. Two are on the after side of the wings of the docking bridge (see picture), two at the after end of the promenade deck, two inside the bulwark at the forward end of the promenade deck (as may be seen in the illustrations on page 707, May 16) and two more halfway along the promenade deck between the davit tracks for Boats 3 and 4. The close-up picture reproduced on page 472 shows the welded cradle into which the lifebelt is placed and the floating light with its bulb at the lower end, with the rope by which it is attached to the lifebelt.

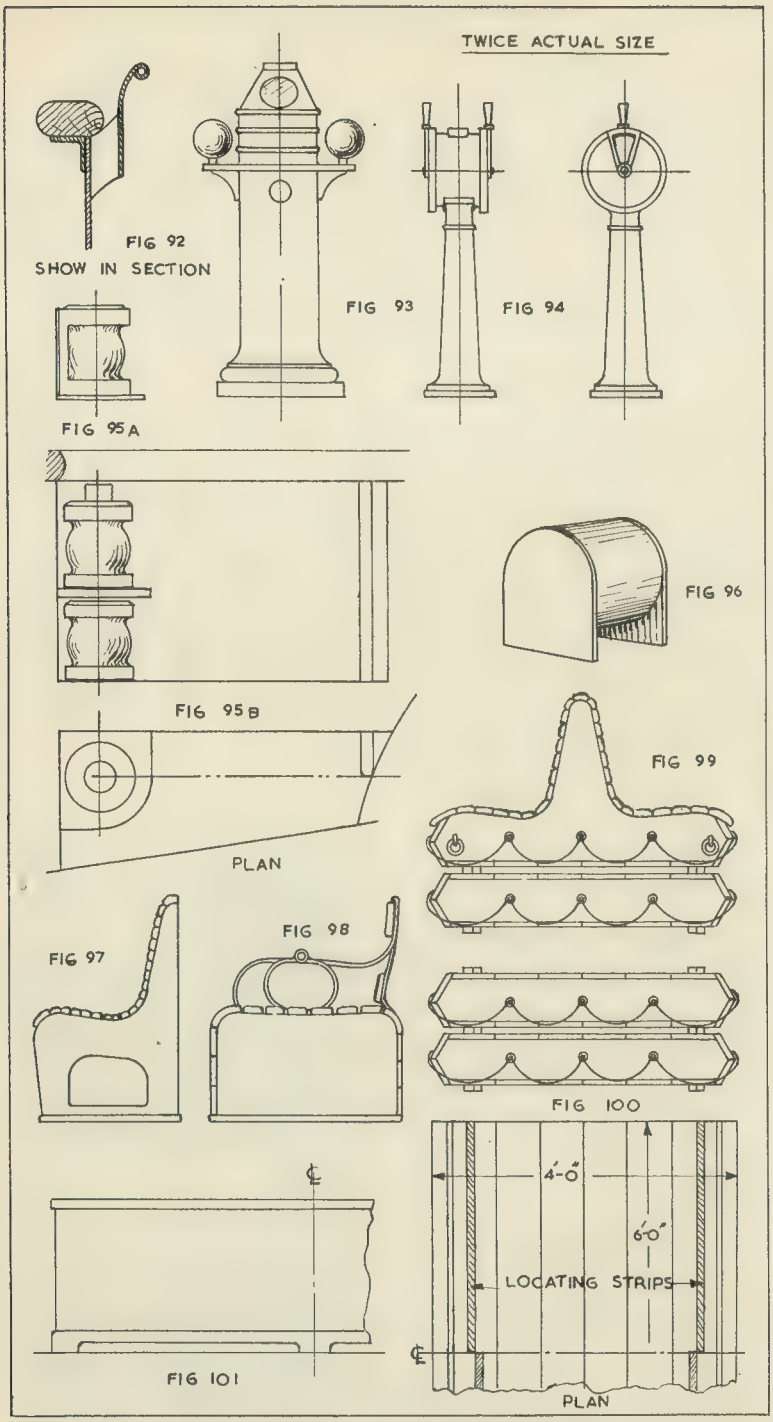
The lifebelt is approximately 30 in. dia., 6 in. or slightly more in width, and 3 or 4 in. in thickness. It is painted red and white in quarters, with the ship's name and port of registry on the white portions, and the company's house flag on the red.

Incidentally, the house flag is blue, white and blue in horizontal bands and the flagpole yellow ochre or mast colour. The floating light is painted red.

THE VENTILATORS

There are a number of ventilators on the wheelhouse top, and as these are conspicuous they should be included. This applies more particularly to the cowl ventilators. These are all of 6 in. dia. and are arranged two on the starboard side and three on the port. They are from 2 ft 6 in. to 3 ft above the level of the deck. Those on the starboard side may be seen in the February 7 cover picture.

Top: Lifebelt lockers and Pleno ventilating unit. Below: Double buoyancy seat. Note reel, lifebelt and blocks on deck for the locating seat, which has been moved



Top, Fig. 90: *Plan of superstructure showing deck fittings. Below, Fig.* 91: *Plan of docking bridge depicting deck fittings*

Symbol key for Figs 90 and 91
SC: Standard compass, ERT: Engine-room telegraph, DT: Docking telegraph, SL: Side lights, WT: Water tank, TS: Teak seat, BS: Buoyancy seat, DBS: Double buoyancy seat, LR: Life rafts, LBL: Lifeboat locker, WR: Wire reel, MV: Mushroom ventilator, CV: Cowl ventilator, DF: Direction finder, ML: Morse lamp, EF: Exhaust fan, BB: Battery box, RS: Rocket stowage.

I have ignored the smaller mushroom ventilators, as they are low and not easily seen, but the 17 in. mushroom ventilators on either side of the Pleno ventilating unit must be shown. That on the starboard side is visible in the picture on page 845 (June 13) and is about 18 in. high above the deck.

There is also a 12 in. mushroom ventilator just aft of the foremast and one, 9 in. dia., further aft on the port side. This is visible in the illustration of the lifeboat lockers in this issue. Two smaller ventilators are visible on the right but I have ignored these, too. The diameter of the head of the mushroom ventilators is about $1\frac{1}{2}$ times that of the vent pipe and its depth about half.

There is yet another 12 in. ventilator in the Pleno unit, but of this more anon.

SEATS AND LOCKERS

The ship carries a variety of seats, many of them being designed to serve as rafts in case of emergency. Fig. 97 shows the teak seat which is simply a seat and nothing more. It is 8 ft in length with a slatted seat and a number of intermediate frames (see, also, picture on page 845, June 13).

One of these is located on the forward shelter deck just forward of the hatch, and seven are to be found on the boat deck, two aft, four forward, and one at the base of the funnel.

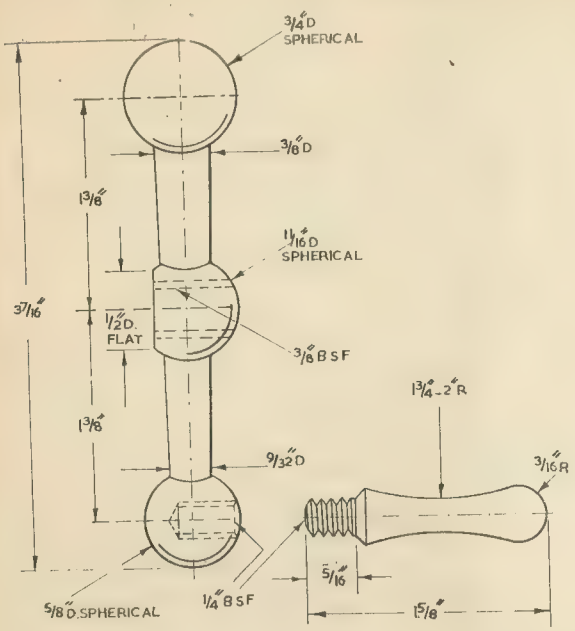
As its name implies the buoyancy seat is made to support people in the water in case of emergency. The general details may be seen here, with the dimensions in Fig. 98. The overall length is about 8 ft 6 in.

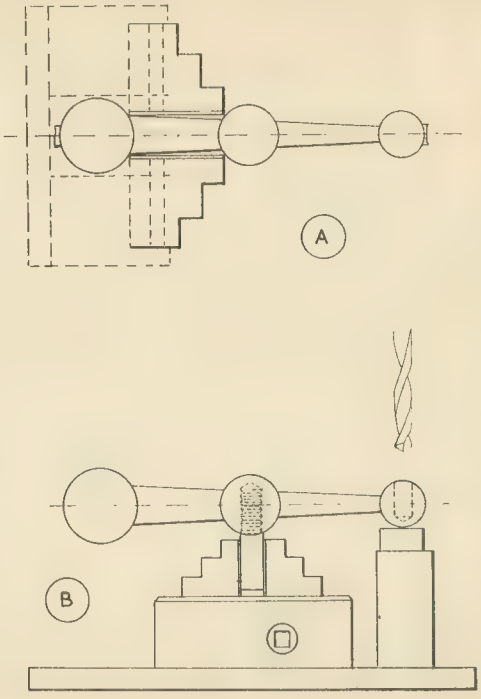
The back of the seat appears to be hinged so that it can be folded over towards the front. Nine of these seats are required, one being placed on the forward shelter deck just in front of the superstructure, seven on the boat deck just alongside the funnel, and the remaining one on the docking bridge.

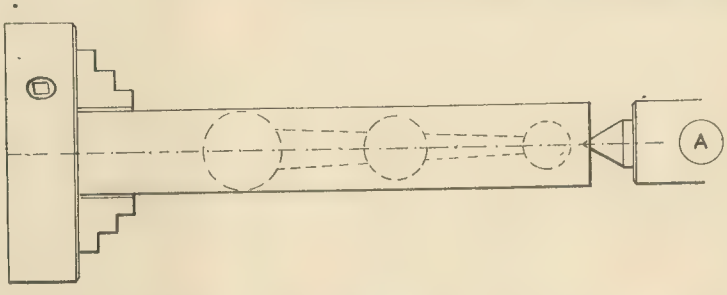
The double buoyancy seat is a combination of seat and life raft. The seat proper is in two layers, so arranged that the upper one can float away from the lower and thus form two rafts. They are keyed to one another, as will be explained later in connection with the life rafts.

The dimensions are given in Fig. 99 and the method of construction will suggest itself to the builder from a study of the photograph. Six of these seats are required, two on the docking bridge and four on the boat deck near its after end.

● *To be concluded*

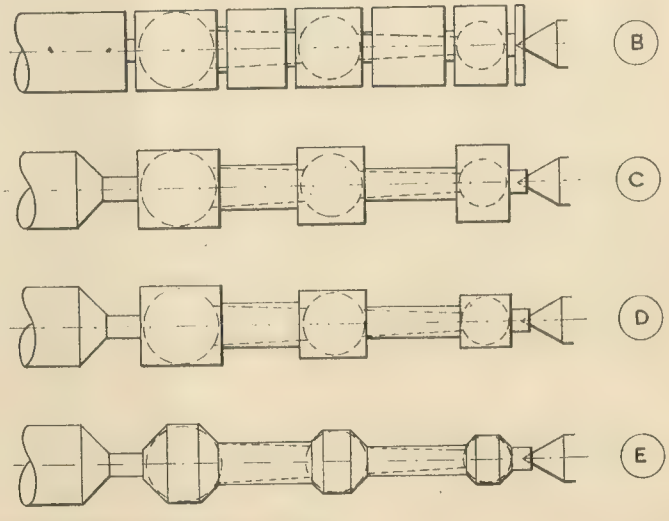






Top, Fig. 1: *Details of the ball handle for the EW leadscrew*

Right, Fig. 3: *The sequences for machining the ball handle*



Top, right, Fig. 4: *Details for* (A) *chucking the handle for finishing and* (B) *drilling for handle*

Modifications to an EW lathe . . .

of the ball it may be gripped in the drill vice in a horizontal position, it is then a simple matter to scribe or form two lines by drawing the edge of a horizontally held steel rule over the upper surface, first in one direction, then at right angles; this will make a "hot cross bun mark" and the point of intersection of these two lines will indicate the centre which may be centre punched, spot drilled, drilled and tapped.

After mounting as at Fig. 4 *B*, the small ball may be similarly marked and drilled for the handle; the set-up at *B* ensures that the axis of the handle is parallel with that of the leadscrew.

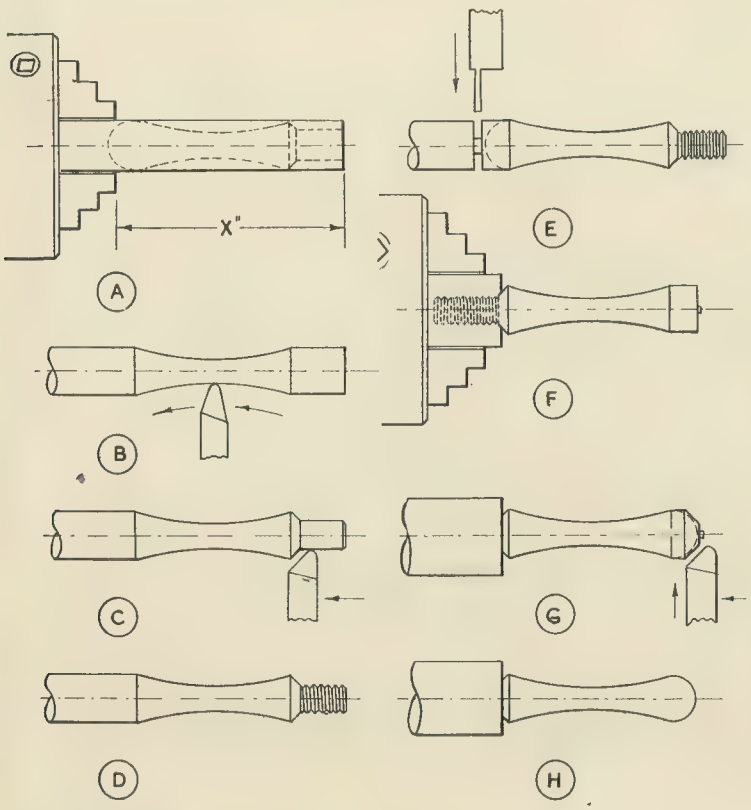
MACHINING HANDLE FOR BALL HANDLE

Unless this job is attacked in a systematic manner it will be found that the results will be far from satisfactory but, as with the ball portion, an understanding of the basic design is of considerable help.

If Fig. 1 be again referred to it will be seen that the handle consists of two chief radii, one along the length blending with a smaller end radius of one-half the stock diameter. I found that all attempts at guessing the larger radius or trying to form it by hand manipulation of the compound slide resulted in disappointment, which even the liberal use of a file would not correct; but complete satisfaction was obtained after arranging for a tool to move through the desired radial path.

I did not make a special holder, but mounted the tool in a tool post of the adjustable height type, together with a hand lever to swivel it, and some washers underneath to prevent its dropping down the stem part of the holder. With the tool projecting with the cutting edge at the required radius from the centre of the tool post, the task became both interesting and very pleasant. Doubtless a four-tool turret could be arranged to swivel under similar conditions.

Below, Fig. 5: The sequences for machining the handle



In Fig. 5 I have set out the aetual sequence of operations which will require but brief explanation.

Initially, the amount of stock *X* which should project from the chuck (*A* Fig. 5) will be, to a certain extent, dependent upon the radius setting and other minor adjustments dictated by convenience, and it is, therefore, best settled by experiment.

If the lathe is inclined to chatter, tail-stock support may be given for operations *B*, *C* and *E* although at *E* the piece must not be parted right off with such support. At *F* the nearly completed handle is screwed into a special threaded chucking piece to facilitate the final operations of rough machining *G* and polishing *H*.

Filing a flat

It will be noticed that the centre ball of this handle is drilled right through and that there is a fairly liberal flat formed upon the inner side. The purpose of this flat is to provide a reasonable seating for the $\frac{3}{8}$ in. BSF nut against which the handle is locked. Such a seating is a worthwhile refinement to any handle of this nature although, of course, the threaded hole is usually blind.

Attempts at filing the flat or seating often result in its not being square to the thread but it may be formed easily in the lathe by mounting upon an odd length of screwed rod which is allowed to project from the chuck jaws for a sufficient distance to enable a left-hand knife tool to be used for machining.

Care must be taken to see that there is reasonable clearance for the handle to revolve without striking the tool holder or turret; also, it is as well to make sure that the larger ball will not commence to strike the tool shank as the cut progresses—the alarm caused by the sudden noise is quite likely to result in a rapid retraction of the tool, away from the ball but into the chuck jaws ! ▣

MAKE YOUR CASTINGS

Foundrywork for the Amateur by B. Terry Aspin is a profusely illustrated book covering all aspects of light foundrywork. Types of sand, moulding boxes and pattern making are fully discussed and there are copious references to the melting of iron, aluminium and cupreous alloys. Stirrers, skimmers, plungers, fluxes and innoculants are also dealt with fully. Price 5s., plus 3d. postage, from Percival Marshall, 19 . Noel Street, London, W1 (USA and Canada $1.25).

Beginner's Workshop

RUBBER BUSHES

By GEOMETER

THE resilience and shock-absorbing properties of rubber, making it especially suitable for mountings of engines, motors and major components, render it no less useful in numerous minor situations where static bushes are required to give protection, and where movement through a small arc is involved. There is also the advantage, over ordinary metal bushes, that no lubrication is necessary—all movement being accommodated in the rubber itself.

Used for protection or as a draught or weather excluder, a rubber bush—usually called a grommet or ferrule—is moulded with a pair of flanges to keep it in position. Common applications are to pipes, control cables or groups of wires where these necessarily pass through metal panels or bulkheads, as on road vehicles.

Size may vary, as at *A*, from a button for a small pipe to a fairly large disc for a sizable conduit or harness with several wires. Where fitting to a pipe or wires already in position would entail considerable dismantling for a grommet or ferrule to be slipped over an end, it can be slit and clipped on, then worked into the hole in the panel and using a smear of wet soap if necessary.

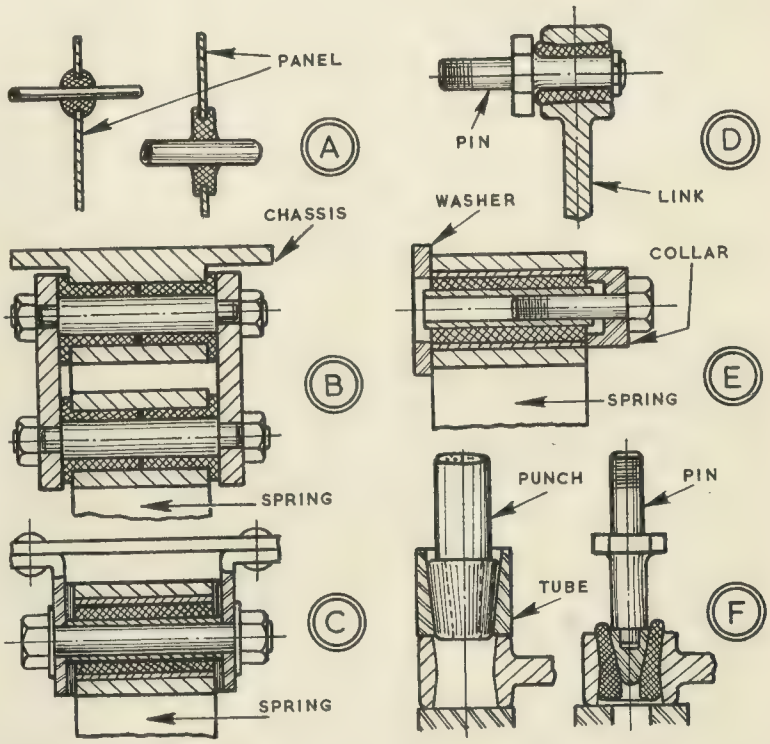
Working bushes carrying loads and accommodating small angular movements may be plain, flanged or moulded in metal housings or sleeves (silentbloc variety), choice of type depending on the function required.

In mountings, as at *B*, flanged bushes are used for swinging links or shackles on leaf springs of road vehicles, obviating lubrication and insulating chassis and body to some extent from tyre and suspension noise. Shackle pins have shoulders, and side-plates are pulled up to these by nuts.

In other mountings one shackle pin only works with rubber bushes, the other in the chassis having a metal bush. The rubber bushes mainly reduce noise, since the pin in the metal bush needs to be lubricated. The arrangement, however, limits side movement or sway occurring with two pins in rubber bushes, owing to flexibility.

To avoid such flexibility bushes employed for fixed ends of leaf springs are metal or silentbloc type, as at *C*. This bush consists of inner and outer steel sleeves, rubber filled.

The outer sleeve is the width of the spring leaf while the inner is longer for clearance. On each side of this spigot portion a fibre washer may be fitted, and the shackle bolt—passing through the mounting brackets—tightens these to the inner sleeve.



A plain bush fitting for a shock-absorber linkage can be as at *D*, each boss of the link containing a rubber bush with a pin which may have a washer on its riveted-over end. The pins are then attached by the shanks to the shock absorber arms, and the axle or spring mountings.

Removal and fitting of rubber bushes is straightforward. To avoid wringing, vehicles should be jacked up the same each side in order to take the weight for the pins to be removed. Flanged bushes can be extracted and fitted by hand. But force, as from a draw bolt and tubing, is required for silentbloc types, taking care, however, to avoid pressure on the inner sleeves if such bushes are to be used again.

A collar to suit the bolt, stepped one end, and passing easily through the spring eye may be employed for removal—and also for fitting, using the vice, as at *E*, with a short guide bolt and a clearance washer at the opposite end.

In fitting springs with rubber bushes to vehicles, particularly silentbloc types, shackle-pin nuts should be loose until after unjacking so that the bushes may be tightened in the working attitude without torsional stress on the rubber.

Bushes for links can be fitted, as at *F*, using a tapered tube and punch to compress each into the link, and a rounded nose on the pin while this is forced through with soap or rubber grease as lubricant. ▣

Modifications to an EW Lathe

MARTIN CLEEVE describes his method of making ball handles

DURING the course of the modifications it was found desirable to make three new ball handles: one each for the top slide, cross slide and leadscrew. It is proposed here to give the dimensions and operations necessary to make a handle for the leadscrew. In the articles upon the top and cross slide the handle dimensions only will be given as incidental to the more intriguing data.

If the reader will refer to the drawing, Fig. 1, he will see the chief dimensions of the leadscrew handle, while the photograph, Fig. 2, apart from its general interest, will give an idea as to the actual appearance of the fitment.

Strictly speaking, a ball handle should be so designed that the larger of the three balls just balance the handle: incidentally, if the whole assembly is termed a "ball handle," what is the name of the three-ball part, without the handle? Anyway, on the question of balance, if this is desired, the size of the larger ball, if at a reasonable radius, calls for the somewhat extravagant use of metal, which, in the opinion of the writer, is unnecessary.

Basically, a ball handle can be imagined as consisting of three balls, of diminishing size, through which a uniformly tapered pin has been driven. If one keeps such a mental picture in mind the task of machining one becomes a little easier. In the drawing, Fig. 3, I have set out the chief preliminary operations involved.

The material, unfortunately, from the point of view of economy, must be of a diameter to suit the largest ball: the various illustrations also show why a somewhat liberal length must be available. *A* (Fig. 3) shows how the stock is held between chuck and tail-stock centre. At *B* a number of parting cuts have been made, care being taken not to part below the stem diameters in each case. In order to maintain strength for subsequent cuts, parting is commenced at the tail-stock end.

Diagram *C* shows how the metal is removed from between the embryo balls and how a clearance space is made at the chuck end to facilitate further operations. At *D* the diameter of the stock has been reduced to conform approximately to that of the balls, while *E* indicates the manner in which the "corners" are removed prior to the finishing operations.

The procedure which I normally adopt for finishing off is to first bring the balls a little nearer to final shape by filing away the remaining "corners" and to form the taper, or stem, between them. It will be found convenient to use a left-hand or round-nose tool for the taper.

Fig. 2: To complete the modifications a number of lever and ball handles had to be made

The cut may be commenced at the left-hand end and, while the reversed self-act is slowly carrying the saddle to the right, the cross-feed handle may be turned so as to gradually increase the depth of cut. Those who have not tried this method of forming tapers will find that it is by no means as impracticable or as awkward as it may appear—far more straightforward and convenient, for instance, than attempting to use the top slide, the feed handle of which is most difficult to turn in such close proximity to the tail-stock body.

In those cases where it is thought that the final cut would become too deep for the strength of the component, two or three passes may be made, starting half or one-third from the right-hand ball, taking one final cut over the whole length. It will be understood that the second taper between the middle and smallest ball is a continuation of the first, the loss of diameter as the imaginary taper pin passes through the middle ball is easily estimated by eye. Having completed these roughing operations, the taper and middle ball may be lightly filed to correct any minor errors, and polished.

Upon cutting away the unwanted metal, the piece may be mounted in the three-jaw chuck as indicated in Fig. 4 *A*. Chuck jaw marks can be avoided by interposing a wrapper of sheet zinc and allowing the jaws to squeeze it into shape.

Although I have taken liberties with the scale of the drawing, it will be found that with any ball member of average size it is possible to obtain a reasonable grip somewhere between one of the balls and a part of the stem.

Having mounted thus and checked for firmness of grip, a series of very light cuts may be taken to bring the small ball near to shape; this followed by file and emery polishing will finish off. Upon reversing in the chuck, the small ball and part of the stem may be similarly gripped for finishing the large ball.

FINDING BALL CENTRES

A reference to Fig. 1 will show that the middle ball is drilled and threaded $\frac{3}{8}$ in. BSF (the leadscrew having been similarly threaded). To find the centre

A 6 pdr Hotchkiss Quick-firing Gun

S. A. WALTER, well known for his models of guns, tells how he built this miniature 6 pdr Hotchkiss

THE prototype after which this model was made is officially known as "Ordnance, QF, Hotchkiss, 6 pdr 6 cwt, Mark II, on Mounting QF, 6 pdr, Mark II, Land Service," and it was produced a few years before the second world war.

The reference to weights in the description relates to those of the projectile and fuze—6 lb.—and of the gun barrel and breech mechanism, which is 6 cwt. (The total weight of the gun is slightly in excess of 17½ cwt.) It was principally used for light defence purposes, etc., and its naval counterpart, similar in appearance, is frequently employed as a saluting gun.

It will be seen that the weapon is manually trained and laid, and has a wedge-type sliding breech, which operates in a vertical plane. Clamping screws hold the barrel stationary when required. A small semi-circular shield offers some protection to the gunlayer, and a Mk II telescopic sight, with a calibrated range drum, is fitted to the left-hand side.

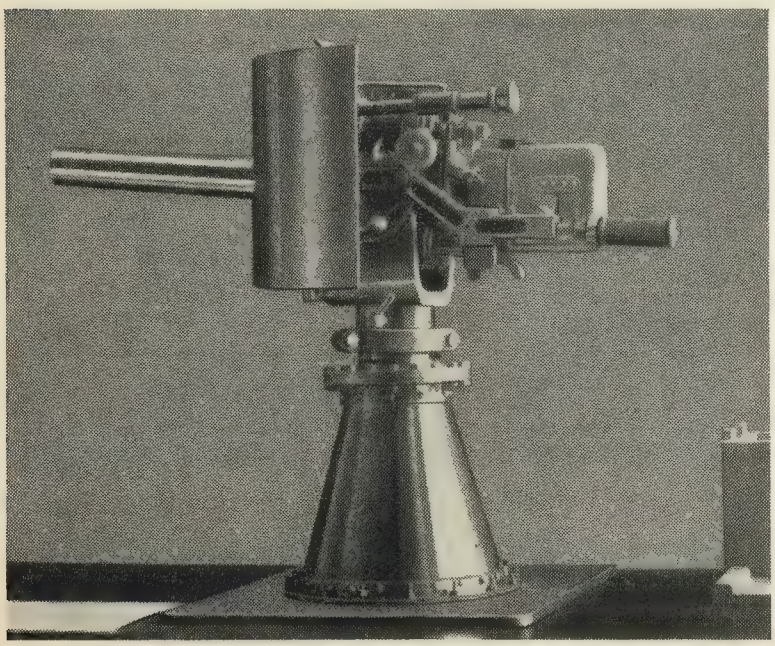
In the model the barrel, made from an old 0.22 in. bore Winchester, is rifled, and as the calibre of the prototype is 2.24 in., the scale very happily works out at 1/10 full size. The breech end is counterbored to receive a spigot turned on the front of the breech housing. Sandwiched between the barrel and the housing is a breech ring, the purpose of which is to anchor the ends of the recoil piston rod and the two running-out bolts, for all of which suitable lugs are provided.

The breech housing is of steel, $\frac{15}{16}$ in. long, 1 in. wide and $\frac{15}{16}$ in. in depth. A rectangular hole is formed in this, the front and side surfaces of which are vertical and square with each other. The rear face is inclined at an angle of 3 deg., the larger end of the hole being underneath.

At each side, and parallel to the rear face, two steel strips are fitted to act as guides for the breech block. These were contrived by filing a slot $\frac{1}{8}$ in. wide × $\frac{1}{16}$ in. deep in each side wall, into which short pieces of $\frac{1}{8}$ in. square steel rod were silver soldered.

The wedge is made of steel, slotted at each side to accept the guides in the housing. On the right-hand side a swan-neck or reversed-curve slot is milled; this engages with a pin on the breech lever. When the lever is pushed upwards by operating the crank handles it raises the wedge, and with the continued movement the block is automatically locked in position.

The angular rear face and guides provide the characteristic wedge action, thus forcing the cartridge into the chamber—in the prototype—and sealing the bore. By pulling the lever in the opposite direction, the first part of the action unlocks the block without, however, moving it—then, as the pin enters the reverse curve of the slot, the wedge, assisted by gravity, drops quickly, thus leaving a clear opening into the chamber ready for loading.



Works smoothly

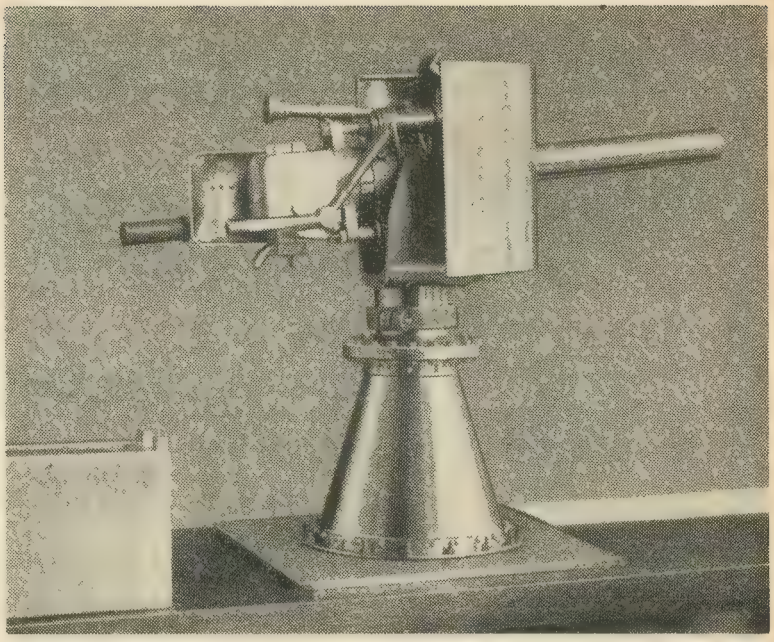
If carefully made, the breech mechanism operates very smoothly. The method of making the wedge and the hole for its reception is similar to that employed for the 4.5 in. howitzer, recently described in MODEL ENGINEER.

On the left-hand side a slot, parallel to the rear face, is milled. This engages with the tip of a small screw in the breech housing, which limits the travel. When the screw is removed, the wedge can be withdrawn.

After the final fitting has been completed, the block and the housing may both be finished off as illustrated.

The breech lever has a bell-crank handle, and a dummy cocking cam is formed on the inside of the boss.

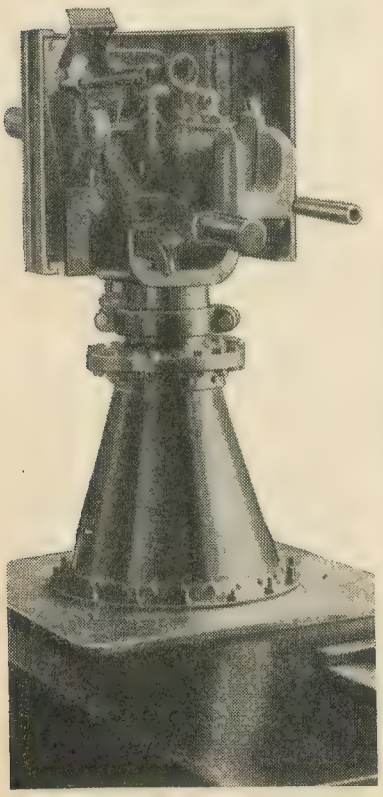
6 pdr Hotchkiss quick-firing gun — *contd*



Both handles are hollow, so that a lengthening lever may be inserted in either when required to give extra leverage.

The barrel slides in a bronze cradle. The recoil cylinder at the top and the two running-out or recuperator cylinders underneath are made integral with it. In the prototype this is a casting, but in the model the unit is built up from tube and strip, and silver soldered. Fourteen separate pieces were used to make it, but with careful wiring-up, plus a little patience, all the joints were successfully negotiated in one operation—and very little cleaning up was required. A trunnion on each side provides for the elevation and depression of the gun.

The body (sometimes called the revolving bracket) is built up from steel plate; the sides and base are respectively $\frac{1}{8}$ in. and $\frac{3}{16}$ in. thick. The inside corners were filled in with triangular pieces of steel, pinned and silver soldered in position so that the curves at the base could be filed up to shape. A hole is drilled and reamed through the base to take the centre pivot.



Bearings at the top, with bushes and cap squares, take the trunnions, but only the right-hand cap square is fitted with a lubricator, the other having a plain countersunk oil hole, as in the prototype. A flange is provided at the front of the body on each side, to which the shield supports are attached by three screws in each.

The pedestal

The body is supported on the top portion of a hollow pivot, and the two are held together with countersunk screws. They revolve on a ball race between the upper and lower parts, as shown, and the two components are prevented from separating by a recessed bronze clip ring made in two halves and bolted together through the lugs.

The pedestal was turned and bored from a piece of defunct steel shafting, with dummy angle rings at each end. At the top, the pivot plate is secured by 18 No 10 BA bolts and nuts, while 16 holes are drilled in the base ring for the holding-down bolts. A series of 3/64 in. round head rivets (ten at the top and 24 at the base) complete the pedestal.

The main—or outer—shield is semi-circular, $3\frac{1}{4}$ in. dia. and 0.040 in. thick. Owing to the difficulty of obtaining steel tube of these dimentions, I had to turn and bore a piece of steam barrel to suit. I originally tried rolling a piece of sheet to size, but could not get the sides straight and parallel.

Brass telescope

The left-hand trunnion is tapped for the bolt securing the shoulder-piece arm. The arm is also supported by a bolt in the cradle, and a curved link, which governs the total elevtion and depression, permits the gun to be clamped at the required angle.

At the rear end a steel bracket holds the gunlayer's shield, and a hole at the lower left-hand corner of the latter is provided for the withdrawal of the wedge stop screw. A wooden handle is fitted, with a lock-nut, for the operation of the arm, and the pistol grip for firing is mounted underneath.

The brass telescope is a plain turning job, and has a $\frac{1}{16}$ in. hole drilled right through it. For the sake of realism, it may be fitted with transparent Perspex "lenses" if desired. It is held in position by a swivel bracket at the front and an elevating screw at the rear, and a dummy range-finder is attached.

The inner shield is an irregularly-shaped curved steel plate, intended to prevent bullets entering the slots in the main shield and so damaging the mounting and sighting gear. It

is supported from the circular flange at the front of the cradle.

The ammunition is made of brass rod, and five rounds rest in the top of a wooden case, which is fitted with rope handles.

The cradle, telescope and sighting gear, pistol grip and clip ring were bronze finished, and aluminium alloy was used for the range drum. All other parts are bright natural finish.

The principal dimensions are:

Overall length: 8 in.
„ width: 3¼ in.
„ height: 6½ in.
Base plate: 4¼ in. sq.

The model was completed in 300 pleasant hours of spare time. ▣

AN OLD CYLINDER DESIGN

By J. N. Maskelyne

IN Smoke Rings for June 20, my colleague Vulcan commented upon a book of old drawings which had then only recently come into my possession, and he mentioned that in it was a loose sheet on which there was a drawing entitled "Model Loco Cylinders."

This drawing is most beautifully executed in that wonderful fine-line technique which has always fascinated me so much, and after very careful consideration, I have decided that a reasonable reproduction of it is just possible, and here it is.

The original gives no indications of the dimensions of these cylinders, but assuming the drawing to be full size, the diameter of the bore would be about ⅞ in. and the stroke 1½ in. Outside, the barrel diameter is 1⅛ in. and its length between the flanges is 1 9/16 in. The centre lines of the piston rod and valve spindle are 1⅛ in. apart.

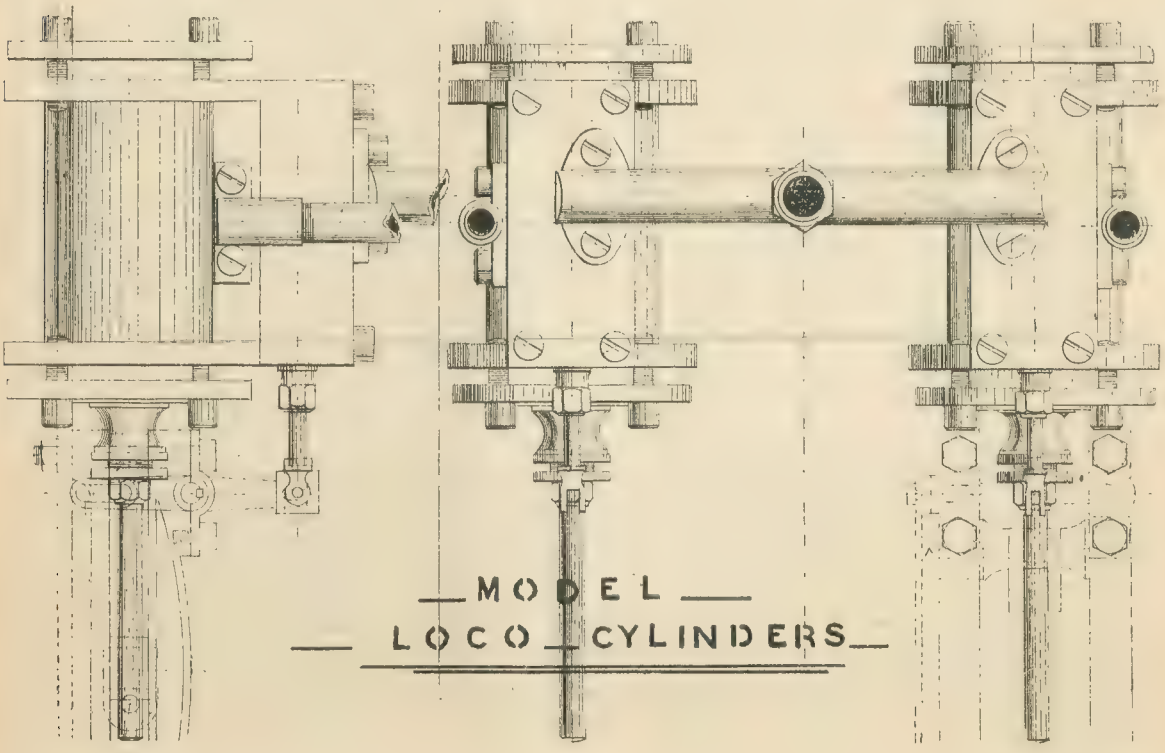
In plan, the centre lines of the two cylinders are 3 1/16 in. apart, and an interesting feature is that, on the cylinders themselves, no provision is made for fastening them to the frames of the engine! A possible explanation of this omission is that the design was intended to allow for the cylinders being used on either outside-cylinder or inside-cylinder engines, and that arrangements for fixing would be made accordingly.

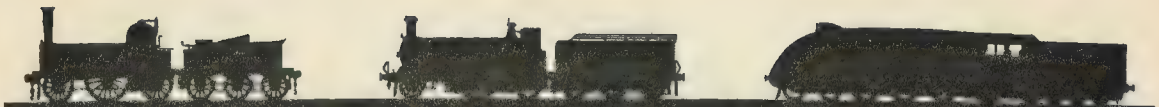
Four slide bars per cylinder, as well as an arrangement of rocking-shaft for operating the valves, are drawn in blue ink, and, therefore, may not show in the reproduction. But the upper slide bar, as seen in elevation, is markedly bellied upwards along its length, and has integral with it at its front end the lower part of a trunnion bearing for supporting the shaft on which the valve rocker is mounted.

The whole design has the merit of simplicity combined with just that amount of necessary machining and fitting to make a worth-while job from the constructor's point of view. And I will add that it readily lends itself to the possibility of fabrication by anyone who would prefer this method of construction; only slight modification of details would be required.

Since most of the other drawings in the book are dated between July 1864 and February 1873, it seems afes to assume that the date of the model locomotive cylinders drawing lies somewhere between these two.

I would be most interested to know if any earlier drawing for model locomotive cylinders now exists; I cannot recall one, but perhaps some reader may be able to. ▣





LOCOMOTIVES I HAVE KNOWN

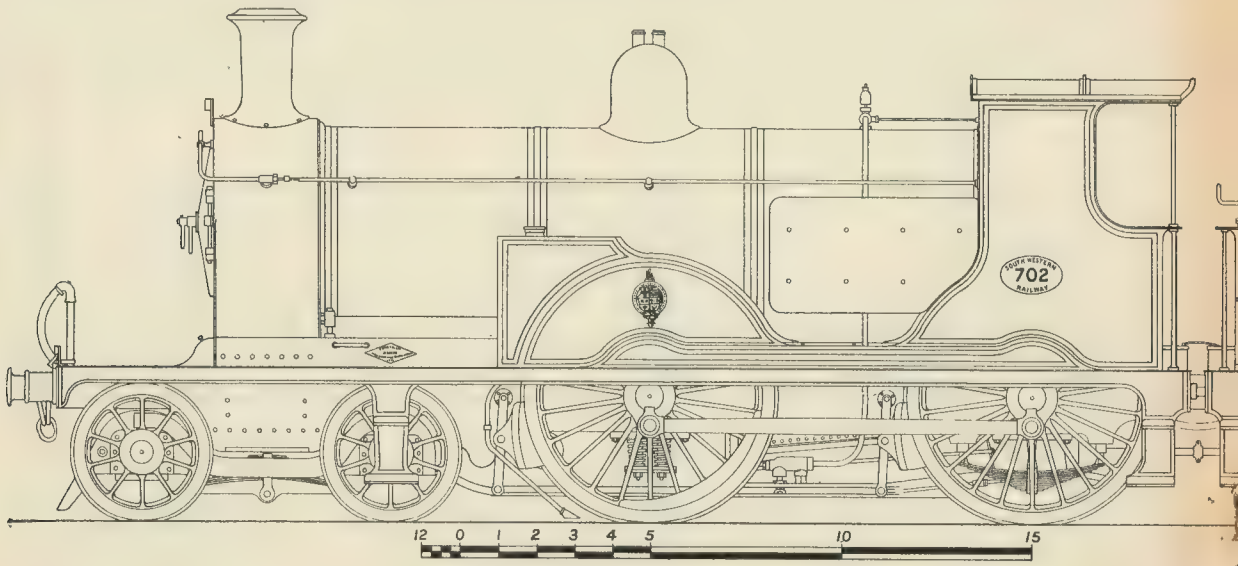
D. Drumm

THE various nicknames that have been so often bestowed upon locomotive types and classes were usually singularly apt, and I know of none that was more appropriate than the soubriquet of "Greyhounds," as applied to Dugald Drummond's celebrated 4-4-0 engines of the T9 class on the London and South Western Railway.

There was something about the appearance of these engines, and not a little about their capacity for speed, that was suggestive of nothing but greyhounds. It was behind No 702 that I first recorded a maximum speed of 80 m.p.h. during a glorious but much too short sprint from Battledown summit, through Micheldever towards Winchester, one day in the summer of 1912.

She was badly overloaded and had struggled doggedly from Waterloo to the summit at Battledown; but, once over the top, the driver seemed to give her her head, and she accelerated at a remarkable rate, with speed mounting into the 80s in a distance of about five miles. She held it until steam was shut off and the brakes applied for a stop at Winchester; to me, it was most exciting.

After that, my regard for the T9 class, hitherto not so very high, changed; in due course, I developed quite an affection for the engines, and it has persisted to this day. The class originally consisted of 66 engines; but they were not all exactly alike, and they could be divided into three different varieties: (1) with no water-tubes in the firebox, and with six-wheeled tender; (2) as seen in my drawing, exactly similar to (1) but fitted with a nest of 61 water-tubes in the firebox, necessitating a prominent casing being fitted on each side of the firebox, immediately in front of the cab and (3) similar to (2) but with wider cab and splashers and fitted with large, double-bogie tenders.



The running numbers were: variety (1), 113 to 122 and 280 to 289; variety (2), 702 to 719, 721 to 732 and 773; variety (3), 300 to 305, 307, 310 to 314 and 336 to 338. The engines of variety (2) were built by Dübs and Co., of Glasgow; all the others were built at Nine Elms Works.

Their dates ranged from June 1899 to October 1901, and the general dimensions were: cylinders, 18½ in. dia. and 26 in. stroke; bogie wheels, 3 ft. 7 in. dia.; coupled wheels 6 ft 7 in. dia., wheelbase, 23 ft 3 in., divided into 6 ft 6 in. plus 6 ft 9 in. plus 10 ft; this last figure was the longest coupled wheelbase in Britain at the time the engines were being built.

The boiler was made in two rings, 4 ft 5⅛ in. and 4 ft 6 in., respectively, in outside diameter; its length was 10 ft 6 in., and its centre line was 7 ft 9 in. above rail level. The working pressure was 175 p.s.i.

Originally, there were 280 tubes of 1½ in. dia., the heating surface of which amounted to 1,187 sq. ft; twenty-one years later, when these engines were fitted with superheaters, the boiler tubing was considerably modified and the heating surface reduced, for there were now 115 tubes of 1¾ in. dia. and 21 flues of 5¼ in. dia., giving, respectively 610 and 311 sq. ft of heating

NUMBER 43

By J. N. MASKELYNE

...ond's Greyhounds, LSWR

surface, the combined figure being only 921 sq. ft.

The firebox heating surface was 148 before, and 142 after superheating, so that the respective totals were 1,500 and 1,063 sq. ft. These figures do not take into account the effect of 61 water-tubes of 2¾ in. dia. fitted in the fireboxes of the engines of varieties (2) and (3); these tubes added about 165 sq. ft to the total heating surface, but their value as such is rather dubious. They were later taken out.

As might be expected, the weights of these engines rather tend to take on the character of a set of permutations, according to the inclusion or omission of superheaters, firebox water-tubes and double-bogie tenders; but the following is an honest attempt to present the facts:

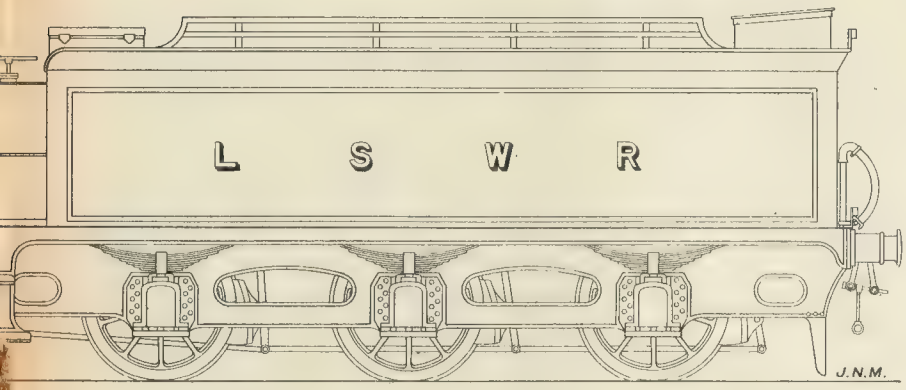
With no water-tubes and with six-wheeled tender, the engine weight was 46 tons 4 cwt and the total 86 tons 8 cwt. With water-tubes and six-wheeled tender, the engine weighed 48 tons 17 cwt and the total was 89 tons 1 cwt. With water-tubes and double-bogie tender, the engine weighed 48 tons 17 cwt and the tender 44 tons 17 cwt, totalling 93 tons 14 cwt. With no water-tubes but with double-bogie tender, the total was 91 tons 1 cwt.

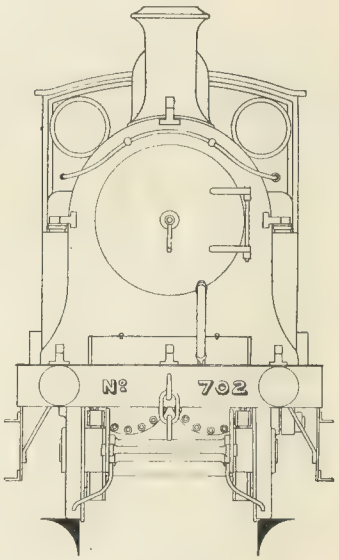
In later years, after 1922, superheaters and extended smokeboxes were fitted, and with the double-bogie tender—which, by this time, had been fitted to all the engines of the class—the total weight was 96 tons 13 cwt. About fifteen years later still, the bogie tenders were commandeered for use on certain 4-6-0 engines, and the T9s reverted to the original six-wheeled variety. On all the survivors of this class, however, the double-bogie tenders have re-appeared !

Engine No 773 was exhibited by Dübs and Co. at the Glasgow Exhibition in 1901, and was given a special external finish for the occasion; she retained it for several years after she was taken over by the LSWR when the exhibition closed. I remember it well, if only because of the little extra embellishments to the lining.

She was immediately recognisable by reason of the almost glass-like surface of her paint and the bright steel tyres of her wheels. In those days, the cleaners seemed to revel in the task of keeping her in absolutely spotless condition. In 1925, this engine was renumbered 733, so that her original number could be used to preserve a sequence for the new King Arthur class engines then on order.

In their prime, the T9 class were often to be seen working west of Salisbury on expresses from London to Exeter and Plymouth. Unlike the Adams 7 ft 4-4-0s, the T9s had no difficulty in working trains over the severe gradients met with in Devon and Cornwall, though it was not very frequently that they proceeded farther than Plymouth.





At the moment of writing, about two dozen T9s are still in active service in the Southern Region, chiefly on local passenger work. When they get the opportunity, however, they are even now capable of running in a manner that justifies their nickname of "Greyhounds."

Incidentally, the six-wheeled tenders used on these engines were unusually long for such vehicles; their wheelbase was 13 ft, equally divided, and there was a 5 ft overhang at each end. ▣

ZOE

In this instalment LBSC describes how the rest of the boiler for the 1¾ in. gauge engine is erected and brazed, and also how the firebox is stayed

Continued from 19 September 1957, pages 412 to 414

THE backhead for this boiler is flanged up from 10-gauge sheet copper. This is much thicker than actually needed to withstand the working pressure, but the reason that I specify it is to allow the fittings to be screwed straight into the plate, dispensing with the use of bushes. If this thickness of copper is not readily available, 13-gauge could be used at a pinch, but I should advise the next gauge thicker that could be obtained. There is little difference in cost.

Lay the backhead former on the copper and mark a line all around it except at bottom, at about ⅜ in. away. Saw out the piece, soften it, and flange it over the former as previously described. File off any raggedness, and well clean the flange with a coarse file. Measure from the top and sides of the wrapper, to the firehole flange. Transfer the measurements to the backhead, and mark out the hole for the firehole flange from them.

Cut the hole a little undersize at first, and offer up the plate, as the boilersmiths say, to the boiler; you can then see if the hole is located correctly, and if not, in which direction it needs correcting. Then finish the hole to size.

See that the inside of the edge of the wrapper is clean, then put the backhead in place with the flange of the firehole protruding through the hole in the backhead, which should stand about 1/16 in. out from the edge of the wrapper when the backhead is tight up against the thick part of the firehole ring. Hammer the flange outwards and downwards on to the backhead, so that the latter is held tightly against the ring.

The firebox side of the ring should be supported on the end of a piece of iron bar held in the bench vice. The edge of the wrapper should be tight up against the backhead flange all around. If it isn't, try gentle persuasion with a hammer; the soft copper is usually amenable to this. If, however, it is obstinate and persists in springing away from the flange, drill a few No 48 holes through the edge of the wrapper and the flange, tap them 3/32 in. or 7 BA and screw in stubs of copper wire threaded to suit. Don't use brass screws. Hold the parts in close contact while drilling and tapping and fitting the stubs.

Cut three pieces of ¼ in. square copper rod to fill the gaps between firebox, wrapper and backhead. Clean them well before fitting, and file the ends to fit the flanges where necessary. An absolutely close fit is not essential, as the brazing materials fills up small cracks, but if there is a big gap, just cut a splinter of copper and knock it in.

The pieces of rod should be set in about 1/16 in. and prevented from moving, while the brazing job is under way, by three or four 3/32 in. copper rivets put through the wrapper, rod and firebox plate. Use a No 41 drill for the holes. Pieces of 3/32 in. copper wire can be used if long rivets are not available.

Drill the holes on top of the boiler barrel, and at the sides at the smokebox end, and fit the bushes. I always make my boiler bushes of copper, as they are then unaffected by the heat of the brazing, which would melt brass bushes. I find that slices of thickwalled copper tube with a suitable step turned to fit the hole in the boiler, make excellent bushes. Tapped bushes are made from copper rod. Gunmetal or bronze can be used where copper isn't available. The dimensions of the bushes needed are shown in the drawing, so I need not dilate on the simple job of turning them.

FINAL BRAZING JOB

Although this is the last boiler-brazing operation, it certainly isn't the least ! However, even the rawest tyro need have no apprehension. Everything is easy *when you know how*. If using only a 2½ pint lamp or equivalent gas blowpipe, I recommend the use of silver solder for this job. With a more powerful lamp or blowpipe, B6 alloy or easy-running brazing strip can be used. With oxy-acetylene apparatus, I recommend Sifbronze, and the special flux sold for use with it.

Cover all the joints with wet flux, and put some around the bushes. Lay the boiler on its back in the brazing pan and pile small coke or breeze up to the level of the foundation ring. Put some asbestos cubes or pieces of asbestos millboard in the firebox to protect the tube ends from the flame. Get your heating apparatus going good and strong; if using a blowlamp, see that there is plenty of paraffin in it. If it goes out in the middle of operations, the job may be spoiled.

Heat the whole lot evenly until the coke begins to glow, and the flux fuses and sinks into the joints. Then concentrate on one of the back corners. When that gets to the right temperature —medium red for silver solder, bright red for the other materials—apply the strip, and when the end melts and runs into the joint, follow the same procedure as mentioned for the first brazing operation, working the flame very slowly along, and feeding in the brazing material as the metal becomes hot enough in the flame.

Keep on dipping the end of the strip in the flux, it helps the molten metal to run and penetrate. When arriving back at the starting-point after completing the circuit, keep the flame playing on the junction place until the metal has melted and thoroughly amalgamated, making the joint continuous. Otherwise you may find a Welsh vegetable sprouting there when the boiler is under water test !

Without losing any time, grasp the boiler with a big pair of tongs and stand it on end, backhead uppermost. As the boiler will be well heated from the previous operation, there is no need to repack it with coke, but go ahead and direct the flame on one bottom corner of the backhead. When that reaches a red heat, apply the brazing-strip or silver solder, and work your way right around the joint. The flange of the firehole ring should be done with silver solder, as that will penetrate better under the hammered-down lip of the ring.

Finally stand the boiler right way up, play the flame direct on each bush in turn, and use silver solder for that job as well. There will probably be no need to turn the boiler on its side to do the bushes for the feed clacks; I find that if the strip of silver solder is applied to the top of the

bush, and this and the surrounding metal are at medium red, the silver solder just flashes around the bush and forms a neat fillet, as long as the right quantity is used. If too much, it runs down and forms a teardrop, which has to filed off, wasting both time and cash.

Let the boiler cool to black, then put it in the acid pickle and look out for splashes. As the pickle runs inside and meets the hot tubes and firebox plates it usually blows out again, and there is a terrific commotion for a few seconds, but it soon calms down.

A way of dodging the splashes is to have the container close to the garden fence, and hang a pulley just above it. Run a line through the pulley with a hook on the end, tying the end of the line to something several feet distant. Lift the hot boiler with a hook bent from stout wire, hang the hook over the one on the line, retreat to a safe distance, release the end of the line and lower the boiler into the container. It's worth a little trouble to save your clothes and skin !

Tip for the unlucky—ammonia will neutralise splashes on clothes or overalls if applied immediately. Any skin splashes should be washed off at once with hot water and soap. While the acid is too weak to corrode, it causes itching. Let the job soak for about half-an-hour, then give it an extra good wash in hot water, and clean it with domestic scouring powder or steel wool.

STAYING THE BOILER

The staying is done according to my usual recommendations. One of the longitudinal stays is solid and furnished with a blind nipple made from $\frac{5}{16}$ in. hexagon brass rod, at each end. The other is hollow and carries steam to the blower jet in the smokebox. At the backhead end it is fitted with a screwdown valve, and at the other end a thoroughfare nipple. The drawing gives the necessary dimensions of these, and as I have given full details of how they are made so many times, it seems a waste of time and space to go through all the ritual again.

Note that when the valve is screwed right home in the tapped hole in the backhead (the holes correspond with those in the smokebox tubeplate) the union should be vertical.

The stays at the sides of the firebox are made from $\frac{1}{8}$ in. copper rod. Set out the location of the holes on the outside of the wrapper and drill No 40 through both plates, using a $\frac{1}{8}$ in. or 5 BA pilot tap for tapping the holes, so that the threads are dead in line and continuous.

Pilot taps are sold by tool dealers advertising in this journal, but I have not long ago described how they can be home-made in emergency. As clean threads are essential, use a little cutting oil (same as used for turning steel) when both drilling and tapping. It is a great help in soft copper and minimises risk of broken threads.

Beginners are sometimes tempted to use commercial brass screws for staying, to save the trouble of screwing pieces of copper rod. This is a bad error, as they rot, due to electrolytic action, and break. It is little trouble, indeed, to hold the bits of copper rod in the three-jaw chuck and screw them with a die in the tail-stock holder, using plenty of cutting oil.

Pull the lathe belt slowly by hand, or the threads will tear. When inserted from the outside of the wrapper and screwed right home they should project $\frac{1}{8}$ in. into the firebox. Put a brass locknut on each, snip off the surplus outside the boiler, rest the nut inside the box on the end of a piece of iron bar held horizontally in the bench vice, and rivet over the stub outside.

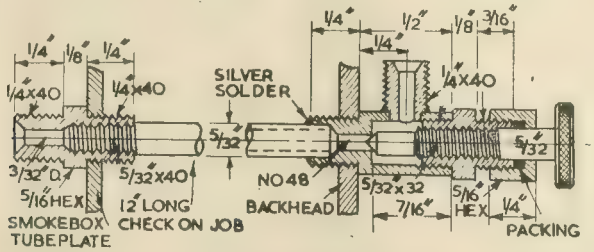
Given good threads, theoretically the stays should be steam and water tight when fitted, but they seldom are in practice (my correspondence tells many a tale of woe !) so sweat over the heads and nuts with ordinary soft solder. Make a wire brush by jamming a bunch of thin iron wires into the end of a piece of $\frac{3}{8}$ in. copper tube and hammering it flat at the end to hold the wires.

Fit a wooden handle. Lay the boiler on its side in the brazing pan and smear liquid soldering flux (not paste on any account) over the stayheads and nuts. Heat the boiler to the melting point of solder with the blowlamp, melt off a few blobs from a stick of solder between stayheads and nuts and, keeping up the heat, brush the melted solder all over them, dipping the wire brush in the flux. Everywhere the flux goes, the solder will go too, so it is easy enough to cover every head and nut.

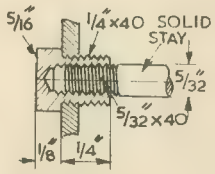
When all are done, give the boiler a good wash in hot water, as all traces of the flux must be removed. If any remains, a poisonous green deposit will form at the spot, which is neither good for the boiler nor for anyone who handles it.

The next item is to test the boiler, and I will deal with that in the next instalment, if all's well. You will need the tender pump to supply the necessary pressure.

● *To be continued*



Blower valve and stay



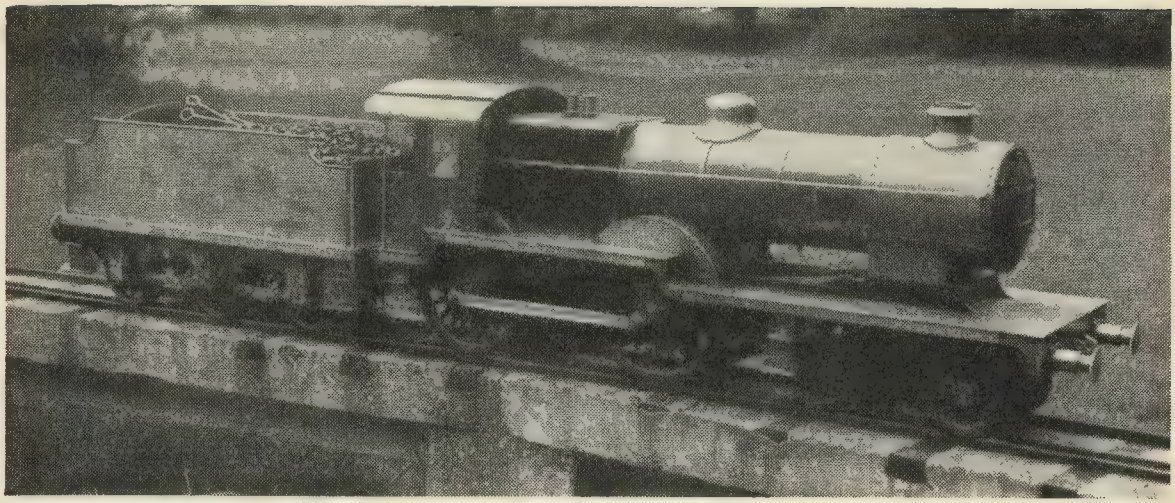
Blind stay nipple

A 5 in. GAUGE MAID OF KENT

SOME years ago, I received a lot of requests to describe a simple type of 5 in. gauge locomotive that could be easily built in the average home workshop, using a $3\frac{1}{2}$ in. lathe and the usual equipment. The requirements were that the engine was to be of reasonably portable size, so that builders with no 5 in. gauge line of their own could take it along to the club track on a small car. Expense was to be kept to the minimum.

The engine was to be a copy of some well-known type with a clean outline. Some wanted a passenger engine, and others preferred a goods engine, and I solved the problem and tried to fulfil all requirements by giving drawings and instructions of both types, using many parts common to both.

The passenger engine was a small replica of the L1 class 4-4-0s of the Southern Railway that did such wonderful work on the Kentish lines before the bridges and permanent-way were strengthened to take larger and heavier locomotives. The goods engine was based on a rebuilt LBSCR 0-6-0 of the type built by the Vulcan



Mr R. H. Procter's 5 in. gauge MAID OF KENT

Foundry Co. to the designs of R. J. Billinton (known as "old Bob" to the enginemen) around the turn of the century.

Before rebuilding they were terrors, as I know only too well from personal experience. The boilers were far too small, and the valve setting was—well, bluepencil, shall we say? Anyway when old Bob's successor rebuilt them with bigger boilers and altered the valve gear, it was a different tale, and many are still running.

Neither class had names, but as I always name my engines for the purpose of easy reference (I have designed such a lot that otherwise there would be a mix-up) I called the passenger engine *Maid of Kent* and the goods engine *Minx* for obvious reasons, especially the latter! A goodly number of engines were built to each design. When an endeavour was made some years ago to build a complete locomotive from scratch at the Model Engineer Exhibition during the time it was open, the *Maid of Kent* design was chosen, although no acknowledgment was made at the time.

The engine shown in the accompanying photograph reproduction is a *Maid of Kent* built by Mr R. H. Procter, who is secretary of the Tonbridge SME, and is especially interesting as it shows how Mr Procter started from small beginnings. He kicked off by building my 1½ in. gauge *Bat* which I described during the war, as it could be run indoors. Then he progressed to 2½ in. gauge with my design for a 2-6-2 *Green Arrow*. Then came two 3½ in. gaugers, my 0-6-0 tank *P. V. Baker* and my Webb compound. He named his version *Ionic*, because he knew the full size one bearing that name. Finally he reached 5 in. gauge with the fine example shown. The photograph was taken by his daughter Lorna.

Mr Procter says that the engine has "gone right" from the word go, no trouble having been experienced anywhere, either in building or operation. He chose the Joy valve gear which I gave as alternative to the Stephenson link motion with which the full size engines are fitted, and she runs either way equally well with the lever just off middle. The only boiler feed is by an injector made to instructions. Recently our friend took the engine to the Beech Hurst line to give her a good try-out on a quiet Wednesday afternoon, and he says that the way she ran was a revelation, sailing up the 1 in 100 grade as if it didn't exist.

The locomotive is not quite complete, as it needs the tender brake gear and a few other oddments to finish off, and it is as yet unpainted, but these wants will be remedied at the earliest opportunity. Our friend added a few words of appreciation for the design, which I very gratefully acknowledge.

Incidentally, full sets of blueprints for both *Maid of Kent* and *Minx* can be obtained from the MODEL ENGINEER Plans Service. These can be put to other uses, as the working parts of both engines can be used to build others of the same type but with different outlines.

Geoff Cashmore has used the cylinders and Joy valve gear of the "Maid" in his LNWR *George the Fifth*, and a correspondent up North writes that he is putting them into a 5 in. gauge *City of Truro*. Well, I'm open to wager that this engine will be able to emulate the original's record of 102 miles per hour without the least difficulty!

Disappointment has been expressed by some good folk who looked for my engines at the Exhibition. The reason why I never offer them is simple—they are not Exhibition jobs! Full-size locomotives are built to pull trains, so I build mine to pull equivalent loads on my own little railway. They look exactly like their full-size sisters in the running-shed—I beg pardon, I should have said "motive-power depot"—except that I keep them cleaner, as the big ones were kept in days gone by, and would, therefore, be out of place in any Exhibition hall.—LBSC. ▣

FOR MOTORIST AND MECHANIC

EVERY owner of an Austin, whether it be a sleek post-war model or a rather elderly Baby, should have a copy of *Austin Cars* by T. B. D. Service (C. Arthur Pearson, 10s. 6d.), now issued in its third edition. For motorist and mechanic alike this eminently practical book is invaluable.

Covering all models from 1932 (when the basic design of the Austin Seven was already ten years old) to the date of publication, Mr Service deals in clear detail with every aspect of the car's mechanism, and the reader is further helped by no fewer than 130 equally clear illustrations. Yet the book, the first in a very welcome series on car maintenance, slips easily into pocket or cubby-hole.

Even the motorist rich enough to pay for his repairs will be better off for reading this comprehenisve manual which makes use of information from the Austin company itself.

A spherical turning attachment

Continued from last week

By Duplex

THE tool post consists of a central pillar *E* clamped to the base and carrying the slotted sleeve *F*.

The pillar is turned from $\frac{3}{4}$ in. dia. mild-steel rod to a close fit in the base and the enlarged head lies 1/32 in. below the under surface of the base. The short length of $\frac{1}{2}$ in. × 26 t.p.i. thread is best screwcut to ensure accuracy.

The upper portion of the pillar is machined to $\frac{7}{16}$ in. dia. and an elongated slot is machined for the passage of the tool-bit. At its upper end the part is reduced to $\frac{5}{16}$ in. dia. and screwcut 26 t.p.i. for the clamping nut.

The slot can be readily formed by first drilling two 7/32 in. dia. holes at 7/32 in. centre distance apart and, for this operation, the pillar should be held in a cross-drilling jig. Afterwards the slot is finished to size either by filing or by machining it with an end mill in the lathe or milling machine.

To make a neat job the slot should be marked out on both sides of the part to serve as a guide when filing from either side in turn and, by attaching a pair of keyseat clamps to a short rule, there will be no difficulty in scribing the slot with axially parallel sides.

The upper clamp nut is machined from $\frac{1}{4}$ in. Whitworth nut-size hexagon rod which, after being bored with a 17/64 in. or a letter O drill, is tapped 26 t.p.i. from the tail-stock.

In the same way the large nut for clamping the pillar to the base is machined from $\frac{1}{2}$ in. Whitworth nut-size rod and tapped $\frac{1}{2}$ in. × 26 t.p.i. after being drilled or bored 29/64 in. dia.

When making nuts, the faced surface should be made the bolting face, for the reverse face, machined after rechucking the work, may not then be accurately aligned with the bore.

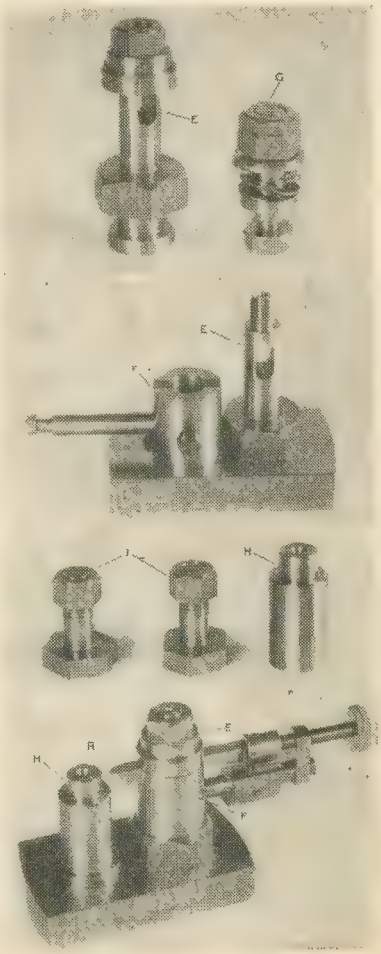
In the present instance the nut was mounted on a threaded stub-mandrel for facing the upper surface to form a true abutment surface for the tool-post sleeve. The $\frac{13}{16}$ in. dia. stepped collar that serves for clamping the tool in place against the upper surface of the sleeve is bored a clearing fit for the $\frac{7}{16}$ in. dia. pillar.

The sleeve *F*, after being bored to a sliding fit on the pillar, is drilled and tapped $\frac{3}{16}$ in. × 40 t.p.i. for the setscrew that locks the sleeve to the pillar so that it cannot shift when the upper clamping nut is slackened to adjust the setting of the tool-bit. When a steel setscrew bears against another part it is advisable to interpose a brass pad-piece, for should the screw tip form an indentation, it may not be afterwards possible to make an accurate and fine adjustment.

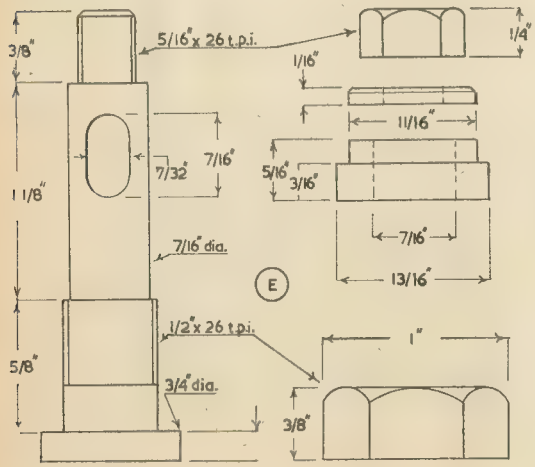
A second hole is drilled and tapped $\frac{1}{8}$ in. × 40 t.p.i. at right angles to the first to carry the bar on which the graduated scale is mounted. To form a flat seating for the bar this hole is recessed to a depth of $\frac{1}{16}$ in. to allow the $\frac{1}{4}$ in. dia. bar to enter.

This recess can be machined either by using a piloted spot-face cutter or by entering a $\frac{1}{4}$ in. drill for a short distance and then forming the flat seat with a $\frac{1}{4}$ in. dia. end mill, which should be entered in the hole with the drilling machine stationary to avoid the work being kicked aside.

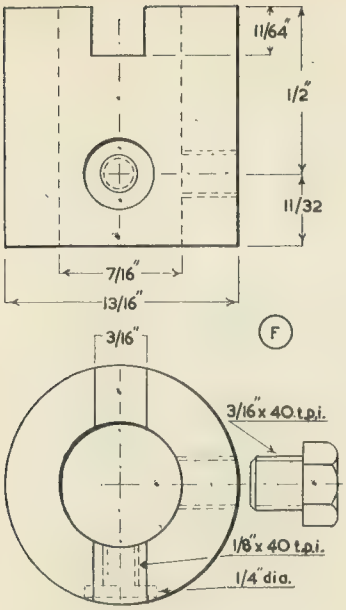
The tool-bit is made from $\frac{3}{16}$ in. square ground stock of the Eclipse brand which is supplied in 2 in. lengths, heat-treated and ready for grinding to shape. As this material varies slightly in size, its diameter should be measured with a micrometer to enable the cross-cut slot in the sleeve to be filed or machined to an



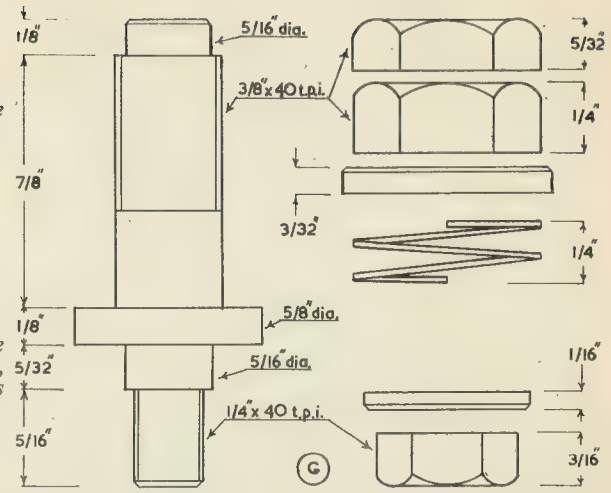
Right, Fig. 7: (Left), the tool-post pillar and fittings. (Right), the pivot bolt with spring washer and locking-nuts; Fig. 9: The tool-post base wtih pillar and sleeve; Fig. 13: The T-bolts and the setting gauge; Fig. 15: The tool-setting gauge mounted on the pivot bolt



Left, Fig. 8: The tool-post pillar bolt



Left, Fig. 10: The tool-post sleeve



Right, Fig. 11: The tool post, base plate, pivot bolt and fittings

exact fit. In my case, the slot was cut in the shaping machine to make sure that a flat seating was formed at a depth that allowed the tool to stand proud of the surface of the sleeve by 1/64 in. so that the clamping collar could grip the tool securely.

THE PIVOT BOLT

The pivot bolt *G* is secured in the base plate *A* by a nut of $\frac{3}{16}$ in. Whitworth size, threaded $\frac{1}{4}$ in. × 40 t.p.i.

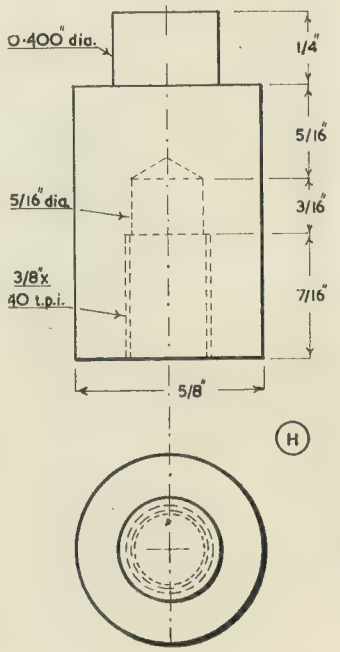
The $\frac{5}{16}$ in. dia. shouldered portion is turned to a light press fit in the base plate. The flange (see drawing) fits into the recess previously machined in the under surface of the tool-post base; the recess in the upper surface of the latter part accommodates a double-coil spring washer which is compressed by a washer and nut secured with a lock-nut to afford frictional control of the operating lever. The pivot bolt and its two nuts are threaded $\frac{3}{8}$ in. × 40 t.p.i. for making a fine adjustment.

The upper end of the pivot is turned to $\frac{5}{16}$ in. dia. for a length of $\frac{1}{8}$ in. to form a register to align the setting gauge that serves for adjusting the position of the tool to an exact radial distance from the pivot centre.

THE TOOL SETTING GAUGE

After the two nuts have been removed from the pivot bolt, the setting gauge *H* can be screwed into place to seat on the washer compressing the spring washer so that it is correctly located. As the spherical turner is designed for doing accurate work, the setting gauge must also be accurately machined and fitted so that the tool itself can be precisely set.

For this purpose the shouldered portion at the upper end of the gauge is turned to a diameter of exactly 0.400 in. so that by bringing the tool point into contact with the gauge and setting the scale and feed screw to indicate 0.200 in., a zero position is established from which work can be machined to any predetermined radius.

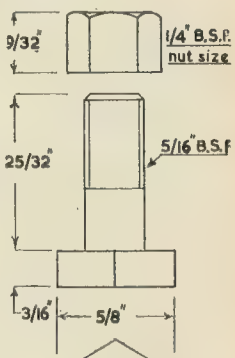


THE T-BOLTS

The T-bolts *J* (Fig. 13) are suitable for the cross slide of the Drummond lathe, but these dimensions may have to be altered to fit other lathes. Nuts of smaller than standard size are fitted so that when lying below the surface in the recesses bored in the base plate, they can be tightened with a box spanner or by one of the ring pattern.

The bolts illustrated were machined from hexagonal material, but where the bolts are machined from the solid —as they should be—round or square rod will serve equally well.

● *To be continued*



Left, Fig. 12: The tool-setting gauge

Right, Fig. 14: The T-bolts

LOOK . . . and LEARN

The 1957 Exhibition offers a lesson. But will we *really* do anything about it? Asks JOSEPH MARTIN

And this is how the Exhibition looked fifty long years ago

WHEN the "long stream of visitors from all parts of the country and even from abroad" poured into the Model Engineer Exhibition of 1907 their attention was immediately caught by an erection on trestles in the middle of the main hall. They were gazing at the locomotive track built and operated by the Society of Model and Experimental Engineers.

Fifty years later the SMEE track was not in the middle of the hall. But it was very much there all the same, and sooner or later everyone had a careful look at it. The youngest, of course, wanted more than a look: they had been promised a ride and they were not going home without one! Peggy Philpot was there as usual to usher them into place, and there too—need I say?—was that keenest of main-line engine-drivers, the untiring Ann Carter, who has been coming to the Exhibition since she was twelve, eight years ago.

Some of the locomotives—Ann's father pointed them out to me—ran in the old building before the Exhibition moved in 1923 to the new hall across the way. One of them, the blue-liveried *Smeaton*, came steaming towards us. "Tom Rowland," said William Carter, "built her years ago and we're glad to see her back after an interval."

Veterans old enough to be my father told me there had never been a Model Engineer Exhibition which failed to include *Cosmo Bonsor*. Generations ago you might have seen her running there with her builder, James C. Crebbin of the Bank of England, at the throttle; and you can still see her year by year—Our Cossie, a memorial to Uncle Jim.

But where does SMEE get its excellent steam coal? This was a frequent question. Model engineers from far and near bring their problems to SMEE at the Exhibition confident that the society, with its long experience and very high standards, will have the solutions or be able to find them if anyone can. Advice is given just as gladly all the year round, but many modellers learn a good deal, or discover that they have a good deal to learn, from actually watching the locomotives and stationary engines at work.

"Look and learn" might indeed be offered as a slogan that sums up one of the most important functions of the Exhibition. While the general demonstration, which has been moved to the front of the show, is fascinating to laymen (especially, I have noticed, to the clergy, who always attend in good numbers) its value for the practising modeller resembles that of a continuous lecture which can at any time be interrupted for the discussion of a particular point.

It was pleasant to encounter the familiar faces: Brigadier D. J. R. Richards, J. T. Brittain, R. J. Collins, G. H. Draper, and J. B. Jenkinson (whose place in the day-time was taken by Dennis Butler). Mr Collins was modelling his *Myrmidon* and asking questions about anything within his field. With equal eagerness Mr Draper occasionally lifted his goggles like a friendly spaceman and talked from the sure strict facts of practical knowledge. Pausing in the construction of a spacing plate for an American modeller, he emphasised the importance of taking one's guidance from those who know at first-hand. "So many beginners," he said, "come

Time off for driver Ann Carter—and a ride for Peggy Philpot, who has sent thousands of children on their happy way along the SMEE track

upon disillusionment because they follow bad instructions."

Working side by side with the veterans were boys from Enfield Technical College, where model engineering is a recognised course. Michael Jack, aged 15, was busy on a tender for *Doris*, his first locomotive and first attempt at modelling, and Kelvin Moonie, another Enfield boy of the same age, was making progress with a tender for ***Bat***.

For R. L. Lee and N. G. W. Snell, instructors at the college, all this must have been a busman's holiday in a big way. Paradoxically, they said, it was also a complete change ! I found them repairing an electric locomotive: it belonged to the Duke of Cornwall and was by no means electrically safe.

Commenting on the Exhibition, Mr Lee said the standard was higher and the variety wider than in 1956. Mr Snell stressed the value of the simpler type of model whose construction could be followed by ordinary members of the public.

Straight up from the demonstration area, model diesel cars of the MRCA were hurtling around the North London SME track at speeds which looked positively alarming. Half a century ago the Exhibition had a Viennese band playing the Model Engineer March (can anyone whistle it ?) and the lilting waltzes of Edwardian England. In 1957 the music was different—more like the protest of enormous wasps on being smoked out. But to enthusiasts such as David Lamb, Herbert Miller and T. W. Pinnock the noise is all part of the thrill.

The angry wasps were heard in the BBC Home Service programme on the Exhibition. John Ellison and Henry Riddell, the commentators, also had something to say about the marine tank, and listeners learnt how the Russians had not only sailed the tanker *Sverdlov* but had thrown water over her deck to prove that she was thoroughly watertight.

None of the MYRMIDON *modellers whom R. J. Collins met at the Exhibition had progressed as far as himself—to plating the hull*

Roy Martin spoke in the same programme of the radio-controlled craft: " We can do some funny things with them." By way of illustration, George Sommerhof, biologist grandson of Schumann, produced his latest surprise. " Would you like to see a torpedo being fired ? Just watch very carefully." Besides sending a torpedo underwater, Mr Sommerhof's boat could draw up to a neat mooring (through the use of a circular magnet) and send a pinnace ashore. For myself, I ask no more.

In contrast with the motor torpedo boat, the IRCMS had some less advanced models to demonstrate. " We have done well," said Roy Martin when I met him with David Ashton, " to bring the simple stuff along."

Richard Mole's tug showed what could be done in radio-control by a twelve-year-old. Indeed, one of the encouragements of the Exhibition lay in the discovery of what the young are doing in model engineering and of what model engineering is doing for them.

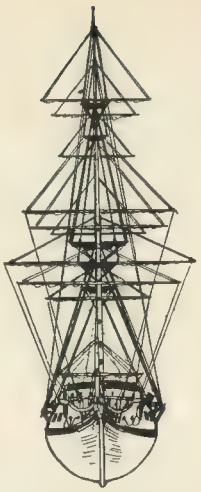
Among the visitors to the first Exhibition were those " on whose apprenticeship indentures the ink was scarcely yet dry," and it may be that the present technological revolution will restore something like the old apprenticeship spirit and turn more and more lads to model engineering in the later phase of their school life. Boys like Richard Nixon, 17, of Brookmans Park, Hertfordshire, and David Wilson, 16, of Harrow, are likely to be glad in years to come that they discovered modelling. I met them in the demonstration area with Richard Hickman, a Harrow aircraft modeller. At 16 Richard knows what he will do. He is going to Handley Page as an apprentice.

Of the lesson which this holds for government and industry I will say nothing—except that the Russians have learnt it already. ▣

Perhaps this boy is shaping his future. Busy every day in the demonstration area were students of Enfield Technical College where model engineering is a recognised subject in the curriculum

MYRMIDON

A SHIP-RIGGED SLOOP OF 22 GUNS



Part 10—Continuing with the rigging, R. J. COLLINS deals, in this instalment, with the reeving of the buntlines and bowlines

Continued from 5 September 1957, pages 326 to 328

TOP-GALLANT clews (Fig.149) are to the same general pattern with the yard blocks 3 ft from the slings and the standing ends 2 ft away. The lower clew block engages with the topsail yard lifts which serve also as the top-gallant sheet. Fore and main with $1\frac{1}{2}$ in. lines and 6 in. blocks, the fore belaying to a cleat on the seventh fore shroud and the main to the first pin in the second pin rack. The mizen of 1 in. line and 4 in. blocks belays to a cleat on the fifth shroud.

The reefing tackles of the top sails (Fig. 150) make use of the sheaves in the end of the topsail yards. The reason for this gear was to take the weight of the sails while the men clawed them up to reef. The standing end of the $2\frac{1}{2}$ in. line should be at one of the cringles at the leech (or side) of the sail but as there are no sails it is made fast with a timber hitch about a quarter in from the yard arm.

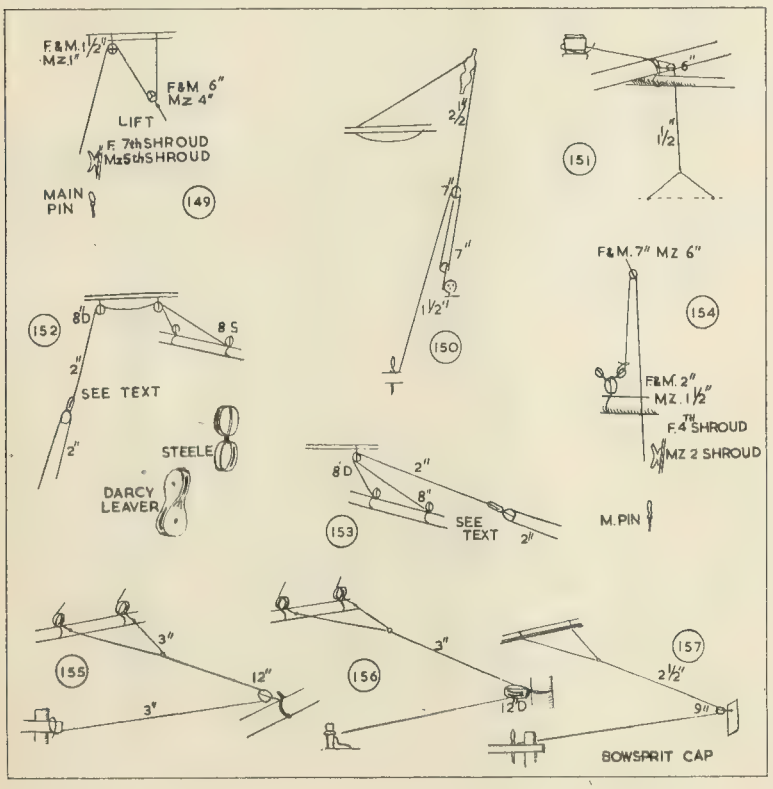
From there it runs, rather loosely, out and up through the yard arm sheave, on to the upper sheave of the sister block lashed to the shrouds and then down about a third of the way to the top. Here it ends in a 7 in. single block. Another 7 in. block is attached to the base of one of the topmast dead eyes and these two blocks are joined by $1\frac{1}{2}$ in. falls which go right down to the outer pin of the jeer bitts.

The next set of lines for the sail rigging are the buntlines, which control the bunt or bottom of the sails. As there are no sails their ends can be left at the blocks on the yard where they can be secured to the legs of the bowlines. The spritsail buntline (Fig. 151) is of $1\frac{1}{2}$ in. and ends in a thimble through which passes a shorter line forming the legs to attach to the sail.

Without sails I should leave these legs off and just catch the thimbled end around the 6 in. block stropped to the slings of the yard. From there it runs back to belay at the starboard knight head. The 6 in. block at the slings can be replaced by a thimble. Steele puts a block in his list but a thimble in his description.

On the model the fore buntlines (Fig. 152) of 2 in. commence at the blocks on the yard where they join up with the legs of the bowlines. Starting at the middle block it goes to the outer sheave of the middle pair of blocks slung beneath the top, down about half way to the rail and there reeve through a block, which I will come back to, up through the inner sheaves of the underslung blocks and down to the inner block on the yard.

Now to consider this other block at the turn. Steele gives two 8 in. single blocks stropped end to end, like a sister block while Darcy Leaver describes a shoe block, that is a sister block with sheaves at right angles to each other. Shoe blocks were in use from a much earlier period than Steele, and Darcy Leaver is after him so obviously it would be correct to use them, but it is the personal choice of the rigger. The line which reeves through the lower portion of whatever block is used belays, both ends, to the foc's'le rail. The main buntlines (Fig. 153) are of similar sizes but in this case the lines come up from the yard blocks, through the double block under the tops from *back to front* and then forward to a double block to belay as the fore.

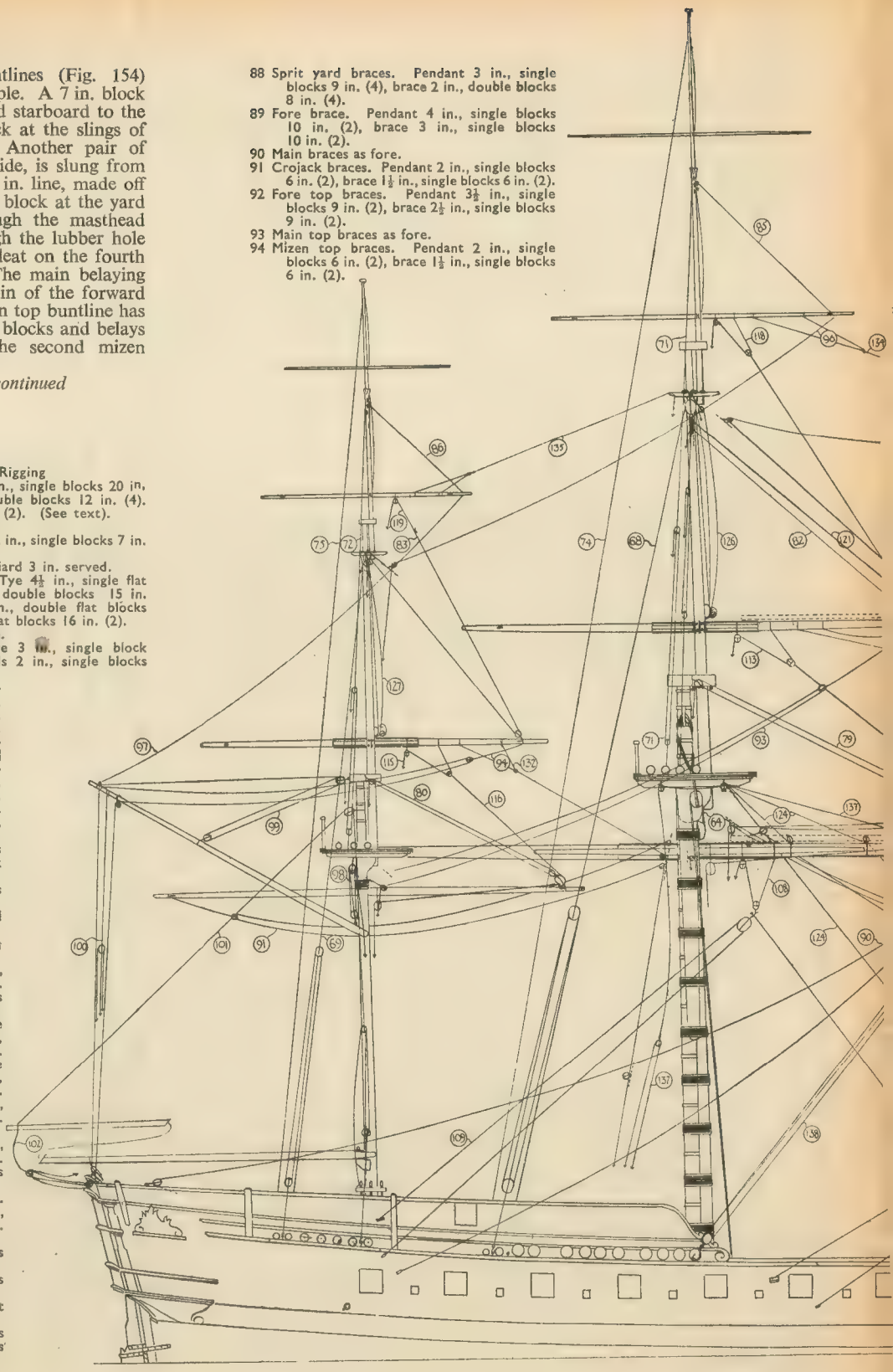


The topsail buntlines (Fig. 154) are much more simple. A 7 in. block is stropped port and starboard to the base of the tie block at the slings of the topsail yard. Another pair of 7 in. blocks, one aside, is slung from the masthead. A 2 in. line, made off to itself around the block at the yard goes up and through the masthead block, down through the lubber hole and belays to the cleat on the fourth forward shroud. The main belaying point is the third pin of the forward pin rack. The mizen top buntline has $1\frac{1}{2}$ in. line and 6 in. blocks and belays to the cleat on the second mizen shroud.

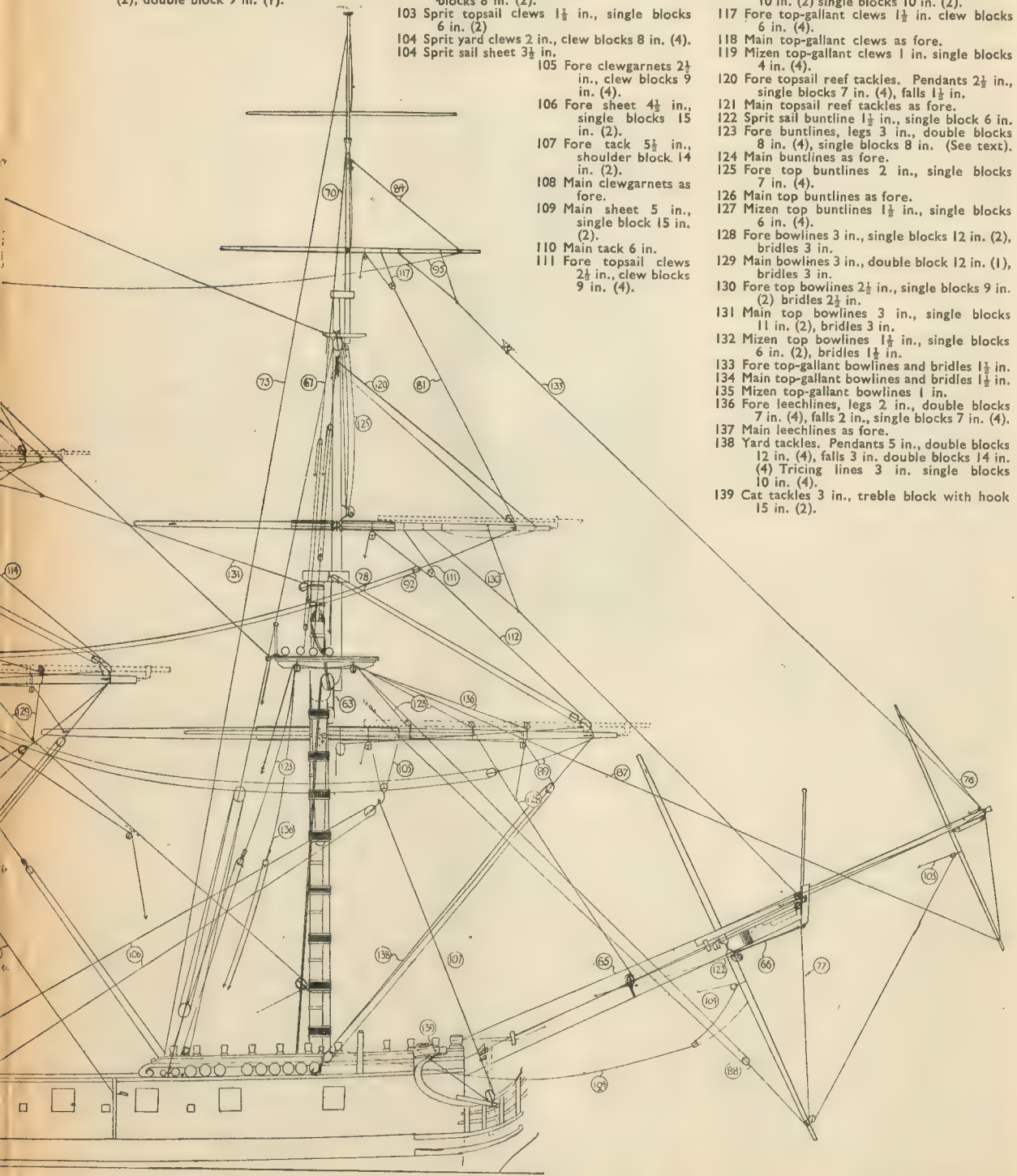
● *To be continued*

Running Rigging

63 Fore jeers. Tye $7\frac{1}{2}$ in., single blocks 20 in. (3), falls 3 in., double blocks 12 in. (4). single blocks 9 in. (2). (See text).
64 Main jeers as fore.
65 Sprit topsail haliard 2 in., single blocks 7 in. (2).
66 Spritsail standing haliard 3 in. served.
67 Fore top haliards. Tye $4\frac{1}{2}$ in., single flat blocks 15 in. (2), double blocks 15 in. (1), haliards $2\frac{1}{2}$ in., double flat blocks 16 in. (2), single flat blocks 16 in. (2).
68 Main haliards as fore.
69 Mizen haliards. Tye 3 in., single block 10 in. (1), haliards 2 in., single blocks 10 in. (3).
70 Fore top-gallant haliards. Tye $2\frac{1}{2}$ in., single blocks 6 in. (2), haliard $1\frac{1}{2}$ in.
71 Main top-gallant haliards as fore.
72 Mizen top-gallant haliards. Tye 2 in. single block 6 in. (1), haliard 1 in. single blocks 5 in. (2).
73 Fore royal haliards $1\frac{1}{2}$ in., single block 6 in. (1).
74 Main royal haliards as fore.
75 Mizen royal haliard $1\frac{1}{2}$ in.
76 Sprit topsail lifts $1\frac{1}{2}$ in.
77 Sprit yard lifts $2\frac{1}{2}$ in., single blocks 9 in. (4), standing lifts 3 in.
78 Fore lifts 3 in., single blocks 10 in. (6), span for cap 4 in.
79 Main lifts 3 in., single blocks 11 in. (6), span for cap $4\frac{1}{2}$ in.
80 Crojack lifts 2 in., single blocks 7 in. (4).
81 Fore top lifts $2\frac{1}{2}$ in., sister blocks 16 in. (2), single blocks 9 in. (4).
82 Main top lifts as fore.
83 Mizen top lifts $1\frac{1}{2}$ in., single blocks 6 in. (4).
84 Fore top gallant lifts 2 in.
85 Main top gallant lifts as fore.
86 Mizen top gallant lifts $1\frac{1}{2}$ in.
87 Sprit topsail braces 2 in., single blocks 8 in. (4).
88 Sprit yard braces. Pendant 3 in., single blocks 9 in. (4), brace 2 in., double blocks 8 in. (4).
89 Fore brace. Pendant 4 in., single blocks 10 in. (2), brace 3 in., single blocks 10 in. (2).
90 Main braces as fore.
91 Crojack braces. Pendant 2 in., single blocks 6 in. (2), brace $1\frac{1}{2}$ in., single blocks 6 in. (2).
92 Fore top braces. Pendant $3\frac{1}{2}$ in., single blocks 9 in. (2), brace $2\frac{1}{2}$ in., single blocks 9 in. (2).
93 Main top braces as fore.
94 Mizen top braces. Pendant 2 in., single blocks 6 in. (2), brace $1\frac{1}{2}$ in., single blocks 6 in. (2).



95 Fore top-gallant brace 2in., single blocks 7 in. (4).
96 Main top-gallant as fore.
97 Mizen top-gallant brace 1 in.
98 Gaff throat haliards 2½ in., double blocks 10 in. (1), single block 9 in. (1).
99 Gaff peak haliards 1 in., single blocks 5 in. (2), double block 9 in. (1).
100 Vang pendants and falls 2 in., single blocks 8 in. (4).
101 Boom topping lifts 3½ in., double block 12 in. (1), double blocks 8 in. (2), single blocks 8 in. (2).
102 Guy pendants 2½ in. falls 2 in., double blocks 8 in. (2), single blocks 9 in. (2), single blocks 8 in. (2).
103 Sprit topsail clews 1½ in., single blocks 6 in. (2)
104 Sprit yard clews 2 in., clew blocks 8 in. (4).
104 Sprit sail sheet 3½ in.
105 Fore clewgarnets 2½ in., clew blocks 9 in. (4).
106 Fore sheet 4½ in., single blocks 15 in. (2).
107 Fore tack 5½ in., shoulder block 14 in. (2).
108 Main clewgarnets as fore.
109 Main sheet 5 in., single block 15 in. (2).
110 Main tack 6 in.
111 Fore topsail clews 2½ in., clew blocks 9 in. (4).
112 Fore topsail sheet 4½ in., shoulder blocks 15 in. (2), single blocks 15 in. (2).
113 Main topsail clews as fore.
114 Main topsail sheet as fore.
115 Mizen topsail clews 1½ in., clew blocks 6 in. (4).
116 Mizen topsail sheet 3 in., shoulder blocks 10 in. (2) single blocks 10 in. (2).
117 Fore top-gallant clews 1½ in. clew blocks 6 in. (4).
118 Main top-gallant clews as fore.
119 Mizen top-gallant clews 1 in. single blocks 4 in. (4).
120 Fore topsail reef tackles. Pendants 2½ in., single blocks 7 in. (4), falls 1½ in.
121 Main topsail reef tackles as fore.
122 Sprit sail buntline 1½ in., single block 6 in.
123 Fore buntlines, legs 3 in., double blocks 8 in. (4), single blocks 8 in. (See text).
124 Main buntlines as fore.
125 Fore top buntlines 2 in., single blocks 7 in. (4).
126 Main top buntlines as fore.
127 Mizen top buntlines 1½ in., single blocks 6 in. (4).
128 Fore bowlines 3 in., single blocks 12 in. (2), bridles 3 in.
129 Main bowlines 3 in., double block 12 in. (1), bridles 3 in.
130 Fore top bowlines 2½ in., single blocks 9 in. (2) bridles 2½ in.
131 Main top bowlines 3 in., single blocks 11 in. (2), bridles 3 in.
132 Mizen top bowlines 1½ in., single blocks 6 in. (2), bridles 1½ in.
133 Fore top-gallant bowlines and bridles 1½ in.
134 Main top-gallant bowlines and bridles 1½ in.
135 Mizen top-gallant bowlines 1 in.
136 Fore leechlines, legs 2 in., double blocks 7 in. (4), falls 2 in., single blocks 7 in. (4).
137 Main leechlines as fore.
138 Yard tackles. Pendants 5 in., double blocks 12 in. (4), falls 3 in. double blocks 14 in. (4) Tricing lines 3 in. single blocks 10 in. (4).
139 Cat tackles 3 in., treble block with hook 15 in. (2).



POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

BUILT A MICROSCOPE

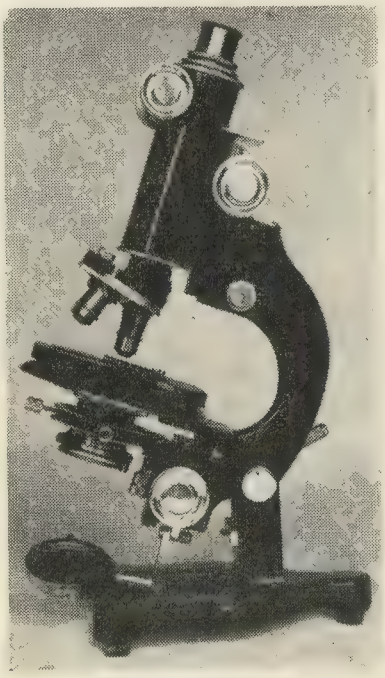
SIR—As a keen reader of ME I thought you might be interested in the enclosed photograph of the microscope published by you about 1953. It was made to the instructions you supplied, the castings for limb and foot being purchased, also the lenses and eyepiece. The rest was made from scrap.

Medical friends have examined and used it and say it is a first-class instrument.

I would not say it is a first attempt, as I have made other models, but it is a first attempt at an instrument.

One thing I would like to see in ME, but I know this would be for the minority, is a constructional article for a good 35 mm. camera, preferably with coupled rangefinder.

Quinton, S. MCCLURG.
Birmingham.



Members of the medical profession have praised this microscope built by S. McClurg, of Birmingham

THE EXHIBITION

SIR,—Going up to London these days for the Model Engineer Exhibition has for me all the urge and excitement of a pilgrimage we read about in dusty history books. Since that distant day when our indifferent old traction engine made news in Vincent Square and I, incidentally, made my debut with it on the silver screen of the then Stoll Picture House, I have never missed this show of shows. Naturally, as one's hairs become countable, there is a tendency to hark back over past exhibitions and compare them with the present.

The excellent contribution in the issue of September 5 by Joseph Martin covered a broad canvas, but I am afraid I do not see eye to eye with his observations; thus I would like to add a few of my own, which I so do in the friendliest manner that is born of sheer enthusiasm.

Your writer quotes a friend in saying he had never seen a better Exhibition. Well, quite frankly I have. Several, in fact. This was underlined for me by the absence of any queue outside on the last day of the show. Again this was furthered by several conversations I had with total strangers in the cafe round the corner, which is quite a rendezvous for model makers, all of whom without exception spoke of the backward trend. I refer to the strong tendency to cater for small boys. Surely this Exhibition is for the adult craftsman, twelve and upwards.

I expect the clarion call of youth to be trundled out, but surely the Schoolboy Exhibition caters very well indeed for Smith minimus and Co., which is the correct place for disappearing ping-pong balls and the undefeatable noughts and crosses machine. In the same category was the huge RAF stand cluttering up the place with an oversized toy. The water tank was almost as big a clanger where cargo ships dashed madly about at far beyond scale speeds, complete with a funny "ha-ha man" behind the mike, who succeeded in driving would-be enthusiasts in search of stronger waters.

How very much better would have been a clear cut commentary about the transmitter, control gear and mechanisms employed, and most certainly correct speeds as I have seen convincingly demonstrated in less fetid surroundings. Sure it was a small boy's paradise, but it takes larger boys and brainier boys to build these fascinating mechanisms.

And since the evolution of the Southern diesel-electrics—which I can hear leaving Battle station two miles distant—I suppose this age demands we have a fair modicum of din in our Show. I am far removed from this new sphere of modelling, yet I can imagine that an outdoor track of length and width could be very interesting, but to coop it up in so small a space destroyed its charm and reduced it to something akin to angry wasps in a goldfish bowl, only worse. And to put models in the vicinity was unfair, for though I twice tried to examine that exquisite model of an old pumping engine, on each occasion I almost ended up in the engine house, until in the end I retired from the fray where eyes travelled figures of eight in tortured sockets. Small boy's paradise again.

Of the competition models, great praise is due. They were given the room they deserve, and were set out at a sensible height which enabled the onlooker to examine them without having to fold up like a jack knife. In workmanship and variety, great heights were attained. I would like to see freelance models in a class by themselves. To copy an original is one thing, the design of a fertile brain, while being just as creditable, is really something totally different. Also I would like to see running performances taken into consideration. Good looks should never be the criterion.

Again if proof be needed of this, then the batch of models running on the SMEE stand provided the answer in block capitals. To the positive scream which will go up "they were running on compressed air" I will reply by saying it would take some very hot steam to take up the slack I saw. Shush! I heard this corner spoken of as "The Chamber of 'Orrers." On the other hand, the engines on the track left no doubts. Not only did they look well, but there was performance to match, and praise be, no funnies.

The trade did us well. Never was

there a better display of tools and equipment to tantalise us, but it was nice to know that if I wanted a pilot tap for boiler stays, or packing for tiny glands, at least it is obtainable, for which many thanks. The handkerchief marking gear I thought a trifle unnecessary. My wife has no difficulty in identifying mine.

However, there is always next year's Exhibition to look forward to. I hope the Americans will come over in strength, and indeed modellers from all the wide world over, for in this field politics are unknown. There's unlimited room for newcomers in our midst. Lastly, congratulations to all at Noel Street for all the work and organising entailed in putting on the Exhibition, maintaining it, throughout until the last model is checked out, and thank you again for all you do in encouraging us to use our hands and brains in healthy recreation which gives that rich inner contentment, a commodity which is beyond price these days.

Finally, if by now you are reaching for a gun, a red pen or both, let me whisper that next year I hope to be an exhibitor myself !

Sedlescombe, Sussex. GEORGE W. EVES.

DIMMERS

SIR,—May I add a comment to the excellent letter by Humphrey Crawshaw [Postbag, July 25] ? Why is it that when describing liquid dimmers one is nearly always advised to use iron plates with soda, or lead plates with dilute acid ? I have always used copper and copper sulphate solution; one can get a large amount of current with panel dimmers.

I have used wide-mounted pickle bottles of about quart size with a bung through which a rod of wood can be pushed up and down, and to this is attached the upper copper wire (the lower end of which is wound into a helix to give more surface) and the other wire pushed down the side of the bung and taken to the bottom of the jar, where it is made into a coil to give more surface.

The copper sulphate solution can be about a third of the capacity of the jar, and the strength varied according to the need of the moment. A small bottle of strong solution can be taken as stock and enough added to water in the jar to serve the current required. The colour will be a guide after a few trials.

When dismantling, the diluted solution is discarded so that packing up is simplified. A jar such as this will carry up to a kilowatt for a time, as I have done in the Scala Theatre.

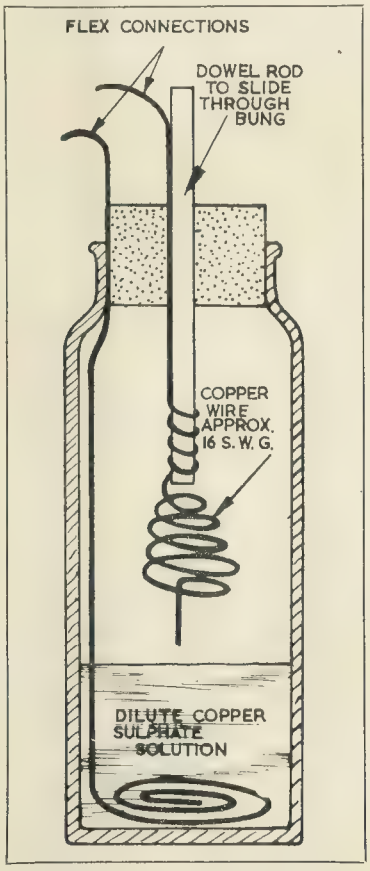
Such a bottle is splendid for use in dimming a fire, by shaking the bottle the fire flickers splendidly, or it can be lighted gradually in a most natural manner.

Abingdon, Berks. A. C. HYDE PARKER.

THOSE RUSSIANS

SIR,—I am shocked by Mr W. Loch Kidston's letter [Postbag, Sept. 5] concerning our visitors from Russia and, at the risk of appearing a trifle pompous, I suggest that we are confronted here with a moral and ethical issue which it is impossible to ignore.

I assure Mr Loch Kidston that this is *not* the way to foster goodwill and understanding in a troubled world. He can rest assured that what is happening in Hungary (and in several other places) matters a great deal to us and if we " pass by " it is only because, as individuals, we can do nothing about it. But does your correspondent seriously suppose that individual Russians are to be identified with the actions of the government which happens to be in power in their land ?



Mr Hyde Parker's method of wiring a pickle jar as an electrical dimmer

It is a sad fact that *all* governments do things which decent people cannot approve or condone. I should be much distressed if some person proposed to hold me responsible for some of the actions of successive British governments since the war, whether in the international or the domestic field.

If Mr Loch Kidston had any knowledge of Russian thought, literature, or music, before 1917, he would know that the Russian people is, in due time, capable of making a very real and vital contribution to the civilisation of the world. Whether it can ever hope to do so under the present set-up is another matter, but " all things flow."

No, sir, I submit that it is our plain duty to seek the personal qualities of people—much like ourselves really—who are shut away behind the iron curtain and to do whatever may be in our power to lower the barriers, not to help to perpetuate them.

At least we all have it in our power to leave the world no worse than we found it in humanity and understanding. I hope that on further reflection your correspondent will find himself in agreement with that.

London, W1. JOHN H. AHERN.

SIR,—We all have our views about the foreign policy of the Russian Government. The Russian models are wonderful pieces of craftsmanship and the fact that they were constructed by Russians cannot affect the issue.

For Heaven's sake don't let MODEL ENGINEER become the airing ground for political opinions.

RICHARD MAPPLEBECK.

SIR,—The ME Exhibition is a parade ground for craftsmen regardless of race, creed or politics. I doubt very much whether the Russians who exhibited their excellent examples of craft had any more influence on the Hungarian affair than did your correspondent on the Suez.

If we are interested in mellowing the Soviet political outlook then surely the best way is to have as much intermixing as we can with our respective nationals.

Equally narrow-minded was your correspondent's views on the youth of Hitler Germany. I had young German friends, some of whom I corresponded with throughout the war, others entered the gas chambers.

As far as human relations are concerned it is the individual who counts and not the flag or government under which he or she lives.

Shaldon, S Devon. C. F. PARSONS.

POSTBAG . . .

SIR,—Those Russians visited England as ambassadors of Russian model engineering skill and goodwill; if more of this spirit prevailed throughout the world, atrocities such as those of Hungary could not be.

The idea of English model engineers visiting an international exhibition held in Russia much appeals to me; I feel sure people possessing the ability to create cannot be those that wantonly destroy.

Let us welcome all nations to our exhibitions and help to maintain a lasting friendship and peace.

Enfield, Middx. H. PLASTON.

We published Mr Kidston's letter in the interests of free speech. We have no intention of dragging politics into MODEL ENGINEER. *Mr Kidston has now been acquainted with the views of fellow readers and this correspondence must now close.*—EDITOR.

CAR BRAKES

SIR,—May I explain to Vulcan [Smoke Rings, September 5] why braking the front wheels of a car does not cause skidding, while braking the rear wheels does.

The fundamental characteristic of a wheel on a road is that it moves much more easily in one direction than in any other. The result is that a car whose wheels turn freely will move in a direction parallel to the planes in which its wheels revolve: if these planes are parallel the car moves in a straight line; if the front and rear wheels are not coplanar the car moves in a curve.

If the brakes are applied so hard that the wheel stops rotating, it ceases to behave as a wheel, and can be treated as a friction pad in contact with the road. In this situation it has no preferred direction of movement.

If the rear wheels of a car are locked by the brakes, any slight sideways motion involves an angular momentum about a vertical axis which carries the centre of mass of the car forward, and the car spins round until it is pointing the wrong way. This is what happens in a 180 deg. skid.

On the other hand, if the front wheels are locked by the brakes, the rear wheels, being free to turn, move much more easily forwards than sideways. The greater resistance to sideways motion prevents a skid; nor can the front wheels move sideways because such a motion would carry the centre of mass backwards.

When front brakes were introduced in the 1920s there was strong prejudice against them. This was based on experience with bicycles. In a bicycle the situation is quite different, because in order to keep it upright the rider must steer the bicycle: any tendency to fall over on one side is counteracted by steering towards that side.

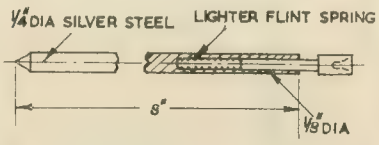
If the front wheel of a bicycle is locked by the brake the machine cannot be steered, because the wheel ceases to behave as a wheel and becomes merely a friction pad. When this happens the rider is unable to keep the machine upright, and disaster follows.

At a motor show in the 1920s I was assured by a technical representative of Rolls Royce that this car would never be fitted with front brakes because they were most dangerous. On the other hand, at about the same time, an Italian firm made a car with brakes on the front wheels only. The early Aston-Martin cars had their front brakes operated by the pedal and their rear brakes by a hand lever, and it was astonishing what experts could do in the way of controlled skidding by manipulating both pedal and lever.

King's Lynn, Norfolk. ROGER NORTH.

CENTRE FINDER

SIR,—Regarding the centre finder [Postbag, September 5] one I made about 30 years ago is, I think, a better design; the spring plunger being at the tail-stock end avoids all possible sag in middle.



A design for a centre finder which G. Berkeley, of Chelmsford, has successfully used for 30 years

A tip for those without an indicator: polish the point-end about 1½ in., provide piece, say, ¼ in. × ½ in. × 4 in. polished one end; let this rest, not clamped, on the tool post, nearly touching, and watch the light between.

Chelmsford, Essex. G. BERKELEY.

WHEELWRIGHT'S LATHE

SIR,—R. H. Rickett's letter and photograph of the ancient lathe interests me very much and I can assure him that it is, indeed, an old wheelwright's lathe.

He does not seem to understand how it was used as he appears to think that the large wheel would be placed in the position of the headstock on a normal metal working lathe. The large wheel, of course, is the means of driving the lathe. Although not shown in the photograph, an endless cord would be placed around the large driving wheel and the small pulley on the headstock and the turner's assistant would turn the handle. The lathe would be used to turn the stocks (hubs) of wagon wheels.

I am employed by the country building and wheelwrighting firm of Messrs L. E. Gye, at Market Lavington, near Devizes, Wilts, and this firm has had in its possession for upwards of eighty years, until just about a year ago, a similar lathe, but ours had a handle on both sides and also it had a second rim attached to the spokes of the large wheel at about half the radius to give a slower speed. This meant, too, that there were two small pulleys on the headstocks.

Our lathe was not in one with the wheel, as is Mr Rickett's, but the wheel was on a four-legged stand and at a greater distance than his, being about 11 or 12 ft away. Our wheel had a similar diameter to his; the second one being about 4 ft dia. The lathe bed was 12 ft long and was made of two parallel baulks of, I believe, 12 in. × 6 in. pine.

I use the past tense in writing of this lathe as it is no longer in the possession of Messrs Gye because, to ensure that this old implement of the past would be preserved, they kindly presented it to the Museum of English Rural Life at the University of Reading last year.

It was in occasional use right up until then, its services being called upon whenever we had to turn up a stock for a cart wheel which was too large in diameter to be turned on the other lathe owned by the firm. I believe the last occasion on which it was used was just about two years ago. If Mr Ricketts would care to have a very good photograph of ours taken outside in the yard just prior to loading into the museum's lorry, I can give him one.

I hope he will do all he can to ensure that his discovery will not be destroyed, but will be placed in some museum somewhere. The great disadvantage of these things is that they take up so much room.

Devizes, Wilts. E. G. CARTER.

Percival Marshall Book Vouchers for 10s. 6d. are presented to readers whose pictures are printed each week in Postbag. They should illustrate points of interest in letters.

Do not forget the query coupon on the last page of this issue

READERS' QUERIES

This free advice service is open to all readers. Queries must be on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling, cannot be given: stamped addressed envelope and query coupon with each query. Mark envelope "Query," Model Engineer, 19-20 Noel Street, London, W1.

Modelling Bluebottle

I am interested in modelling and am intending to build a detailed scale model of the Duke of Edinburgh's Dragon class yacht *Bluebottle*. I wish the finished model to be about 30 in. long and would like some scale plans of the original yacht. Could you please let me know where I might obtain same?—R.P.D., Royal Marines.

▲ *The only likely source of a scale drawing of a Dragon class yacht such as* BLUEBOTTLE *would be one of the yachting magazines. Such a drawing would be of the yacht herself and not of a model. An exhibition model not intended for sailing could be made from such plans.*

A sailing model of a Dragon would be quite impractical, as it would have far too little displacement for stability. The only practicable type of 30 *in. or* 36 *in. model yacht for sailing is similar to that shown in the Percival Marshall handbook "Build Yourself a Model Yacht" by Daniels and Tucker, which includes plans for a* 30 *in. sharpie and a* 36 *in. round bilge yacht.*

BR transfers

I am planning to make a few steam locomotives in gauge 1 suitable for a garden railway. Could you tell me where I could obtain transfers for the British Railways Lion crest in this gauge and transfers for lining and numbers?

In addition, are there any firms which undertake the spraying and lining of models?—B.E.P., Paignton, Devon.

▲ *No transfers are available for the British Railways crests in gauge* 1. *But a firm which would undertake the painting and lining of your models is Keyser's of Shepherds Bush. The full postal address is: Hanover Court,* 197 *Uxbridge Road, Shepherds Bush, London, W*12.

Releasing water

Would cylinder drain cocks be out of place on the old version of LBSC's *Virginia*? If so, are water relief valves the only other alternative for removing the condensate from the cylinders, or can both of these be dispensed with altogether?

Finally, could you give me some information on how these locomotives were decorated? LBSC leaves us practically in the dark!—J.R.R., Surbiton, Surrey.

▲ *It is essential to have some device for releasing water trapped in the cylinders of a model locomotive, and you would be well advised to provide the normal cylinder drain cocks for this purpose.*

With regard to the decoration of these locomotives, it is largely a matter of choice as there does not appear to have been anything approaching a standard system all those years ago—and this is probably the reason why LBSC has given no information.

Accessories for Britannia

I am constructing a $3\frac{1}{2}$ in. gauge *Britannia* and wish to know where I can get bullhead rail, chairs and sleepers.—W.P.H., Birmingham.

▲ *Bassett-Lowke Ltd,* 18-25 *Kingswell Street, Northampton, can supply rail, chairs and sleepers for* $3\frac{1}{2}$ in. *gauge.*

On diesels

Some months ago an advertisement for water-cooled diesel models on the well-known principle of the ether, paraffin and castrol mixture appeared in MODEL ENGINEER. I have toyed with the idea of building a diesel boat, but on examining various engines exhibited in shops fear very much it would be difficult to fit adequate silencer arrangements. Your advertiser undoubtedly had proper exhaust pipes fitted.

As the engine itself, together with fuel tank, carburettor, etc., would occupy very little space in, say, a 3 ft 6 in. or 4 ft hull, one should have ample room to fit silencers. The best form of silencer I know of is constructed by perforating the exhaust pipe for a certain length, and then enclosing it in a tube twice its diameter, which acts as an expansion chamber. My theory is that if two of these silencers were fitted in tandem, the exhaust itself should be practically silenced and then it could be turned into the funnel. Again, if one made an inner funnel out of, say, four $\frac{1}{4}$ in. tubes it would look as if the engine room consisted of four sets of diesel engines, and I feel sure that all you would hear would be a gentle purr.

I should be grateful if you could put me in touch with diesel engine manufacturers, and also let me have your opinion of my theory.—V.B.H., Eastbourne.

▲ *There are several firms at present supplying water-cooled engines suitable for marine work, including Electronic Developments Ltd,* 18 *Villiers Road, Kingston-on-Thames, Surrey, and Davis Charlton Ltd, Hills Meadow, Douglas, Isle of Man. Adaptations to convert air-cooled engines to water-cooled are supplied by Ripmax Ltd,* 39 *Parkway, London, NW*1.

As to silencers, the makers of ED engines can supply silencers which also act as oil separators. It is possible to attain a fair degree of silence by using a single-expansion chamber of fairly large capacity so long as it can be prevented from resonating, as this may in some cases actually amplify the sound. An article dealing with the general principles and practice of silencing was published in ME of 15 *March* 1956.

Although the compression ignition engine has been found perfectly satisfactory as a means of propelling a boat or any other type of model, it has several disadvantages. Among these are the cost of the fuel, the difficulty of preventing contamination of everything around by oil, and, more important, lack of control—quite apart from the noise nuisance you have mentioned.

At present the general tendency is to revert to petrol engines of types which can be controlled and which are much easier to keep clean and reasonably silent.

Separate pipes

I am building *Britannia* and would like to fit two injectors. Is it possible for both injectors to feed into a common delivery pipe to the same top feed clack? I feel there is a possibility that when one injector is in action it may lift the check-valve ball in the other one and so draw air in.—F.A.C., Ramsgate, Kent.

▲ *It is not possible for two injectors to feed into a common delivery pipe. They should have separate pipes and clack valves.*

A ship modeller's diary

By JASON

IN my last notes I was writing about a Yarmouth seaman of several centuries ago. Recently I was sent some books from the Sailors' Home at Great Yarmouth. They related to the Logbooks and Curio collections of nearly 100 years ago. The present building is just 100 years old.

The sender of these interesting records is Mr P. E. Rumbelow, who will be remembered by many modellers for his excellent model of a Yarmouth Drifter a few years ago. This gained him a bronze medal. The present building replaced the coastguard station and is well worth a visit by anyone interested in ships and the sea.

There is a goodly collection of ship models and at least one is a bone model made locally by the French prisoners of war more than a hundred and fifty years ago. Most of the models are of local vessels and nearly all are at least a century old.

The model of the *St Nicholas Lightship* must surely be interesting to modern eyes. There is a whole series of local fishing vessels, many of them rigged, which should be a godsend to anyone doing research into Anglian fishing vessels of a hundred years ago. Two interesting models must be the Royal Yachts *Victoria and Albert* and the *Fairy*. I've often wondered why the Royal Yachts of other days have been so much neglected by modellers ? There seems to be more about.

100 YEARS AGO

OVER four thousand vessels reported themselves annually to this place. A thousand sailors, following shipwreck, were given beds and meals here and helped on their way. The New Universal Maritime Code of Signals was in use (1861), and needed too, for 40,000 vessels passed Yarmouth annually. The resources of this institute were sometimes taxed to the utmost for in one heavy gale 500 vessels suddenly parted from their anchor in the depth of winter, and Yarmouth helped the seamen. Mention Yarmouth today to anyone passing by and beyond bloaters and rock they'd probably be speechless.

Thank you, Mr Rumbelow, for a sight of the books and the general invitation to visit the home.

MANCHESTER AGAIN

MR MIDDLETON tells me of the progress made by this society in the direction which is so important, i.e., work in hand. Consider these extracted items: the brigantine *Leon*, a 12 gun brig, a forty gun frigate, a Thames Barge, a sailing model of the *Cutty Sark* and a Victorian steam pinnace.

Curious how each society treads a deliberate path, for Manchester seems to have taken to sail. When we remember Mr Middleton's medal-winning effort of last year with its beautiful woodwork and splendid rigging the present trend of the society is no great surprise. However, I hope to see them before Christmas.

THE SAWERS PRIZE

IT will be remembered that nearly a year ago I outlined the simple conditions of the Sawers Prize of £10. There were several models which came within the conditions laid down. They were the USS *Constitution*, the *Ark Royal*, *Golden Hind* and the sloop *Mirni*.

The paintwork of the USS *Constitution* was lacking in finish. Why will modellers spoil miniatures for a bob's worth of paint ? The *Ark Royal* had a somewhat better finish but fell short in other directions. The *Golden Hind* was astern of the first two and did not even get the commended diploma, yet in each of these three I could see very good work particularly, on "Old Ironsides," the affectionate name used by Americans for the *Constitution*.

When we came to *Mirni*, however, there was a nice model depending upon the natural colour of the materials for effect. She represented the 20-gun Russian sloop built in 1818 and sent down south in 1820 to help in opening up the newly found Antartic Continent.

It was a tortoiseshell waterline hull on a pleasing sea (design under glass), surmounted by ivory sails, a few of which were depicted hanging in the buntlines or brails.

It clearly deserved the very highly commended diploma and the special Sawers Prize of £10. This leads me to write about the Soviet delegation from Russia and the nine models which they brought with them as samples of work from the Soviets.

THE RUSSIAN MODELS

THERE were four members in the delegation. The leader was Mr Alexander Bliznakov, the chairman and director of the Central Marine Club of Moscow, which could be roughly described as the model-making headquarters of the whole USSR. Village competes with village and the winners go to towns, states, republics and finally to Moscow itself.

Modelling can be a hobby or a form of education. Naturally the latter offers the better choice and return or prizes. Generally the prizes are cameras, watches, tools, radios, etc.

There were two modellers in the delegation—Alexander Vicherov and Djalal Yusupov. The former's Championship Cup winner *Moskba* was about 5 ft long.

In British eyes it was a conventional type model with good clean work around the decks and plenty of well made details thereon. It was a three-island vessel and each island was covered with water-resisting paper pasted on and pen-etched to represent the decking. This was, in my opinion, a weakness.

The metal hull was made of plates and of good workmanship. It was demonstrated on the water a number of times and proved easy of access and manoeuvrability. Mr Vicherov also made an ivory model of a modern Russian trawler about 14 in. long. The whole model was of ivory and unrelieved by any colour, scale 1-100.

Mr Yusupov comes from Sebastopol in the Crimea and he seems to specialise in ivory models. His three exhibits were all to the same scale, 1-200, roughly a yard each in length. Ivory was used throughout with the minor exception of some gold and rubies. Two were cruisers (*Sverdlov* and *Voroshilov*) and one a passenger ship from the Sea of Azor.

The guns, torpedo tubes, and pedestals (of the model) were left natural.

The fourth member of the delegation, Mr A. I. Veselovski, an engineer, was a professional model maker and is working on a 45 in. model whale catcher which will be radio controlled. Other models (without their modellers) were *Krim*, a large static model of a passenger steamer of a conventional type, a 15 in. model of *Lenin*, an atomic-powered icebreaker now building in Russia.

The sloop *Mirni* completes the nine models along with the half model of the cruiser *Varyag* which distinguished herself in the Russo-Japanese War (1904). ▣

CLUB NEWS

EDITED BY THE CLUBMAN

BRITISH RAILWAYS are providing a continuous film show at the exhibition to be held this month by Chester Model Railway Club in the Town Hall. The four-day show is followed on the last night with a Members' Hour, when visiting clubmen will inspect all the layouts and other exhibits and then compare notes.

Locomotives range from OO gauge to 7¼ in. live steam. There is a OO gauge layout, a 3½ in. gauge track running along one side of the hall, and a model engineers' workshop where members are seen at work on live steam engines, including a 7¼ in. chassis. Trade stands, a visitors' stand and a buffet are other attractions.

Through this page vice-president S. P. Williams (4 Oakfield Avenue, Upton Heath, Chester) invites the visitors from other clubs to make themselves known at the Workshop Stand and to take part, if they wish, in the Members' Hour from 8 to 9 p.m. on the Saturday.

This is the club's sixth annual exhibition. It opens on October 16 at 4 p.m., on the two following days at 10.30, and on the Saturday at 10. Closing time is 9 p.m. except on the Saturday when it is an hour earlier—which means that the inspection takes place when the public have left.

INTERNATIONAL INTEREST, NOW

I am told that the track show put on by the **Model Rail Car Association** at the Model Engineer Exhibition has created interest in places as far from London as New York and Mexico City. In England club members at Dover and Weymouth have responded with enthusiasm.

Close running at times added to the pleasure of the spectators. The opening day saw the establishment of a lap record of 2.00 secs. This was a flying lap as distinct from the standing start of common practice, and it represented an actual speed on the track of just under 300 m.p.h.

By the last day a Bath member had whittled it down to 1.9 sec., the equivalent of 360 m.p.h. full-scale.

The association is greatly pleased with the show and the response, and very grateful to the firms which helped in one way or another. Following the Portsmouth meeting in September, there are open meetings for the national championship at Bath later this month (October 20) and at Bournemouth on November 3.

"If you're in the area," says secretary D. J. Lamb (18 Alfred Street, Bath, Somerset), "come along and see how we run." He also invites all who are interested in model diesel-car racing to write to him.

HIS MEMORIAL

When **Weymouth and District MES** held its recent successful exhibition one of the stewards was George E. Grundy, aged 75, of 218 Portland Road, Wyke Regis. Mr Grundy had been a founder member of the society and though his health had not been good for some months he looked forward to doing his best at the show alongside his younger colleagues. His sudden death, a few minutes after he had collapsed on duty, came as a shock and grief to all who knew him.

The society has lost a good friend, but a memorial to his skill remains in the 5 in. gauge club locomotive *Maid of Athens* which he named and largely built.

It was while trying to run her that he collapsed. "His friends feel sure," writes secretary H. W. G. Swindell, "that had the choice been his he would have preferred no other end."

Mr Grundy on the locomotive he spent so much of his time on, during its first steam test

NOT CAMBRIDGE!

Some clubs send me their announcements just in time to be too late. **Cambridge and District MES** is not among them. On the contrary, secretary M. J. Atkin (35 York Street, Cambridge) wrote in months ago with news of an exhibition next year.

The society, which is affiliated to **SMEE**, plans a seven-day show covering the whole of East Anglia and areas as far as North London, Luton, Bedford, Peterborough and Spalding. Combined entries, for which transport can be arranged, are invited from societies, and there is a welcome for the work of individual modellers whether or not they are club members.

The date: March 23. The place: University Examination Hall, Cambridge.

ME DIARY

October 3 Eltham and District LS rummage sale, Beehive Hotel, Eltham, 8 p.m.
October 4 Rochdale SMEE cine show, W. F. Jackson, Lea Hall, 7.30 p.m.
North London SME at ER Gas Offices, New Barnet, 8 p.m.
October 5 REC auto-train tour of mineral and other lines in Guildford, Aldershot and Reading areas.
JIE film evening, 7 p.m.
York show ends.
Bristol SMC "Ships in Miniature," Bristol Museum and Art Gallery (October 5-26).
October 6 Birmingham SME visit to Derby Works and Railway Museum (New Street Station, 10 a.m.).
October 8 JIE membership committee, 6.15 p.m.
October 12 JIE paper "The Problem of O and M Study," W. J. Kease, 7 p.m.
October 13 IRCMS at Kingsley Hotel, London.
October 16 Chester MRC sixth annual exhibition, Chester Town Hall (October, 16-19).
Birmingham SME, Bits and Pieces Night, White House.
October 18 Birmingham SMS "A Doctor Afloat," Dr Stanley Wood, Imperial Hotel, Temple Street, Birmingham, 7.30 p.m.
Rochdale SMEE general meeting, Lea Hall, 7.30 p.m.
October 19 Warrington MES track day, Earlstown near Warrington.
Chester show ends.

Model Engineer

Classified Advertisements together with remittance should be sent to Model Engineer, 19/20, Noel Street, London, W.1, by latest Thursday morning prior to date of publication. Advertisements will be accepted from recognised sources by telephone. GERRARD 8811. Ex. 4

CLASSIFIED ADVERTISEMENTS

★ Private: 3d. per word. Trade: 6d. per word. Minimum 12 words. Use of box 1s. 0d. extra.

★ Rates for displayed advertising in this section. Trade 35s., Staff 45s. per single column inch. Column width 1⅞ in.)

The Advertisement Manager reserves the right to refuse or suspend advertisements without giving any reason. Every care is taken to avoid mistakes, but the publishers cannot be held liable in any way for printing errors or omissions. Receipt of "copy" for publication implies acceptance of these conditions by the advertiser. Whilst every care is taken to exclude advertisements from doubtful sources, no responsibility can be accepted by the publishers for the bona fides of advertisers.

WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Workshop Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

Genuine Offers. Tinman's jenny, strong good condition, £3 10s. New wiring machine 4 pairs rollers, 2 closing, £15. Edwards 21" tinman's bending rolls bench machine as new, £15.—S. PLUMBLEY, Station Road, Freshwater, I.O.W.

Selecta Home Workshop, quite new, cost £14 10s., bargain £10 10s.—Box No. 8640, MODEL ENGINEER Offices.

Wanted. ½" motorised bench drill. 6" or 8" double ended grinder, 240/50/1.—POYSER, Peck's Hill, Mansfield. Phone: 148.

Bench Grinder. Make one, save money, double-ended motor, £3 10s. Stamp reply.—Box No. 8633, MODEL ENGINEER Offices.

Milling, Grinding, saw table attachments, turrets, or castings. Drill grinding jigs, collets, B.A. screws. List 6d.—G. P. POTTS, Yew Grove, Troutbeck, Windermere.

ADJUSTABLE PARALEX HOLE CUTTER

Parallel Shank ⅜", capacity 4" 26/-
" " 7/16" " 6½" 28/-
Carr. paid, incl. packing.
Also Taper Shank Models
Send for illustrated price list

LUDFRY LTD

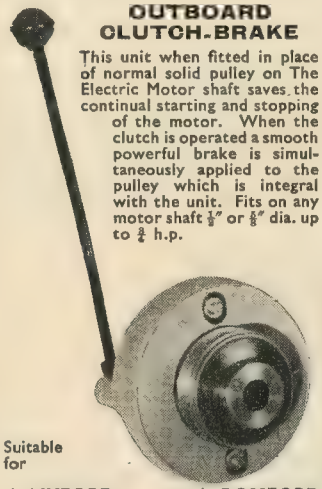
5 Hanway Place, London. W.1
Telephone: MUSeum 7472

New Tools. Thread chasers, inside, outside assorted, all different, 24 for 12s. No. 1 M.T. shanks, 7" overall drilled ¼", 5/16", ⅜", three for 7s. 6d. Precision needle files, 9s. 6d. doz. 12" hacksaw blades, 2 doz., 5s. B.A. hand taps, two each, size Nos. 2, 3, 4, 7 B.A. for 7s. Circular diestocks, 13/16", 2s. 9d.; 1 5/16", 3s.; 1½", 4s.—A. KING, 152, Halfway Street, Sidcup, Kent.

Myford Type Dividing Head, two plates, first offer £6 secures.—MASON, 148, Blackmoss Lane, Aughton, Ormskirk, Lancs.

OUTBOARD CLUTCH-BRAKE

This unit when fitted in place of normal solid pulley on The Electric Motor shaft saves the continual starting and stopping of the motor. When the clutch is operated a smooth powerful brake is simultaneously applied to the pulley which is integral with the unit. Fits on any motor shaft ½" or ⅝" dia. up to ¾ h.p.



Suitable for
★ MYFORD ★ BOXFORD
★ SHAPERS ★ SOUTHBEND etc.
★ SPECIAL MACHINES Fully Guaranteed
Price £6 10s. 0d. carriage extra, or £1 10s. 0d. Deposit and Five instalments of £1.
Details S.A.E.
WANSTEAD SUPPLY CO.
30, The Broadway, Woodford, Green, Essex

ML7 Lathe. Fitted maker's clutch and cabinet stand as new. Rust proof cover. "Griptru" chuck 4-jaw chuck accessories, gauges, micrometer, other measuring inst. All as new. Callers only—W. D. STEPHENS, 2, Brynllwchwe Road, Loughor, Glam.

Myford ½" Capstan, motorised, V-belt drive, steel tray and collets, 250/1/50, little used, could be adapted to centre lathe, £22 10s. Carriage paid.—Below.

Silver Steel. ⅝" dia., greatly reducde price, material surface rusty, not suitable for shafts, but satisfactory for machining smaller diameters. 1', 2', 3' lengths, 2s. per ft. Postage extra.—LLOYD, Moor Road, Brinsley, Notts.

Lathes (motorised). Ace 7" × 42" s.s. and s.c., gap, £69. Sheldon 5" fitted Norton gearbox, £95. Atlas 5" bench type s.s. and s.c. reconditioned £58. Littlejohn 5" s.s. and s.c., two chucks, £95. Willson 7½" all-geared gap bed, s.s. and s.c., £275. Hobson 5½" all-geared on cabinet reconditioned, £115. Terms. —VICTA ENGINEERING CO., Maidenhead. Phone: 50.

"E.W." 2½" × 10" Convertible Lathe. We can now arrange delivery of this much sought after lathe. All accessories from stock. S.A.E. lists and illustrated leaflet.—WANSTEAD SUPPLY CO., 30, The Broadway, Woodford Green, Essex.

New Eagle surface grinders, £185. Marlow vertical milling machines, 28" × 8", £235.—VICTA ENGINEERING CO., Maidenhead, Phone: 50.

S.C.B.G. 3½" Lathe, chucks, accessories, tools, £12 o.n.o. Details—101, Knightsdale Road, Weymouth.

DICK SIMMONDS & CO.
5 South Road, Erith, Kent
Drawings and materials for our celebrated 0-4-0 Tank Loco "Hercules" in 7¼" Gauge. "AJAX" in 5" Gauge and "BEATRICE" in 3½" Gauge. We hold large stocks of castings for many "L.B.S.C." Locos at keen prices.
We are specialists in Boiler Constructions and we braze customers boilers.
LISTS FREE FOR S.A.E.

Holtzapffel Ornamental Lathe with wide range accessories, fine condition.—A. H. KELLY, 36, Hill Rise, Cuffley, Herts. Tel.: Cuffley 2608.

Super Adept Lathe as new, 1⅝" × 6", countershaft, 4-jaw chuck, faceplate, wood chuck, £7.—BATE, 85, Hampton Lane, Solihull, Warks.

3½" Drummond s.c. and b.g. lathe on maker's stand complete with treadle and self contained countershaft for motor drive, chuck, faceplate, change wheels and vertical slide, £20.—BIRCHER, Hadley, Shropshire.

Cincinnati Horizontal Milling Machine cone drive, table 22" × 9", motorised, real bargain.—R. LAW, 17, Grange Close, Hayes, Middx.

5" B.G.S.C. Lathe, gap bed, 24" centres, 15" dia. faceplate, complete with 1 h.p. 230/110 volt, a.c. motor, countershafting, pulleys, changewheels and turning tools, price, £35. Apply—78, The Grove, Ealing, W.5. Evenings only (EAL 2711).

★ **SWISS MUSICAL MOVEMENTS!** ★
The Famous **"GUEISSAZ"**
The only movement with a 12 Months' Unconditional Guarantee
For Cig. Boxes etc. 18/-. Long Playing Tunes from 28/-. *Delivery by return.*
Beautifully Illustrated Catalogue 1/- refunded on 1st order.
Send S.A.E. for free tune list.
M. MOSS & CO.
Woodlands Parade, Feltham Hill Road, Ashford, Middx
Tel: ASHFORD (Middlesex) 4465/3382

Lathes Bought, Sold and Exchanged, send for the bargain priced used lathe list, 1s. From used lathes specialists—CORBETT's, Stanton Hill, Sutton-in-Ashfield.

Brazing Lamps, 5 pt. ex-govt., used, G.C. with pressure gauge, 45s. each.—H. GUTHRIE, Crossgate Hall, Dalkeith, Scotland.

3½″ Portass Dreadnought centre lathe with stand but without motor. Also Champion bench drill, £28. PER 7380.

Drummond B type headstock, tailstock, changewheels. Buyer collects.—JARVIS, 43, Newports, Crockenhill, Swanley, Kent.

MODELS AND FITTINGS

Traction Engine Wanted, model to 3′. Write airmail to—ORLANDS CORNELL, Sidney, New York.

Meccano Wanted. Red-green large size. Also pre-war Meccano magazines, instruction books, super model leaflets and part 167-a. —IRVING, 14, Merston Drive, Manchester, 20.

Wanted. 7¼″ Gauge and 9¼″ gauge open wagons, preferable Bassett-Lowke, or similar. —A. J. H. HOMAN-RUSSELL, "Latimer," Hooton, Wirral. Phone: Hooton 3446.

Hielan' Lassie 3½″ gauge locomotive and tender. May be seen working by appointment. With driving truck, £65.—COOK, "Sedes-Mea," Station Road, Willington, Beds.

Wanted. 30 c.c. Seal Major or similar engine for marine use. Perfect running order essential.—Box No. 8634, MODEL ENGINEER Offices.

7¼″ Railway Complete. Midge locomotive, boiler by Goodhand. Two 6′ aluminium bogie trucks, 600′ aluminium track—400′ oval and 200′ straight. All in first class order. £350 the lot or offer. Demonstration to bona fide purchasers on continuous track. —LAMB, The Fold, Stratford-on-Avon.

CATALOGUES

Tool & Materials ... ... 9d.
L.B.S.C. Blueprint & Castings ... 1/-
Refunded on first 20/- order.

HANDRAIL KNOBS

"O" Gauge ... ... 2/9 doz.
1 in. ,, ... 3/- ,,
2½ in. ,, ... 3/3 ,,
3½ in. ,, ... 3/9 ,,
5 in. ,, ... 4/3 ,,

Overseas orders a speciality.

KENNIONS BROS. LTD.,
2, Railway Place, Hertford. *Phone* 2573

2½″ Freelance 4-6-4 Tank, coalfired, commended M.E. Exhibition 1934, mechanical lubricator, Walschaerts. Slight repairs needed, has hauled 27 stone, £25. 3½″ Caledonian 4-4-0 chassis, wheels, cylinders, and drive, also tender, chassis and wheels completed. Valve gear, tender bogie frames, brake rigging nearly complete. Boiler requires brazing sundry parts under construction, some drawings, £25. And various micrometers, £1 each.—KIRBY, Phone: RAV 0637.

10¼″ Equipment. Two all steel boilers, new with regulators, two sets of cylinders, piston valve, new, complete set of wheels for the above, also drawings. These parts for "Royal Scot" or similar, the lot £175.—26, Hog Hill Road, Romford, Essex.

Marine Engine. A really beautiful twin cylinder, ¾″ × ¾″, £21. Unusual type horizontal engine, about ¾″ × 1″, fitted piston type water pump, £6 15s. Brand new Stuart No. 10 horizontal £7 10s.—Box No. 8649, MODEL ENGINEER Offices.

5″ Gauge 0-6-0 locomotive chassis, ready for boiler, £25. Stuart No. 4 vertical engine 1½″ bore, £10.—38, Great Gardens Road, Hornchurch, Romford.

Coal-fired fire tube boiler ¼″ welded steel 14″ × 6″, all fittings. High speed steam engine $\frac{13}{16}$″ × 1$\frac{1}{16}$″, coupled to enclosed type dynamo. Worthington type twin steam boiler feed pump ⅝″ × ¾″, £20 the lot or separate. 1½″ scale freelance portable, coal-fired, all fittings, road wheels and few minor details to finish, £10. Twin vertical marine compound 1¼″ × ¾″ × 1$\frac{1}{16}$″ stroke, £5. Three-drum water tube boiler, 8 gauge copper, steamdrum 10″ × 3½″. All assembled for brazing, £8. All items are good sound models. Offers considered for any. Full details and photos, s.a.e.—FORSTER, 5, Burnholme Drive, Heworth, York.

L.N.E.R. 2″ Scale passenger coaches (four) less bogies, £12 10s. each.—SMITH, 77, Devonshire Road, Morecambe, Lancs.

New Synchronome master electric clock, complete set of finished parts for sale (particulars), silvered dial Invar pendulum rod, extra dial movement, oak case, £20. —As below.

Robinson hot air engine, 4½″ bore cylinder, very good working condition, collection necessary, £14.—DEWHURST, Riverside House, Reedham, Norwich.

Hielan' Lassie Boiler, cost £32. Also completed smokebox and super heater, sell £20 complete.—SIMONS, 2, Market Terrace, Albany Road, Brentford. EALing 7231.

Traction Engine, complete model wanted, state price and particulars to—BARROS, 223, Queens Drive, Liverpool, 15.

ELECTRICAL

A.C. Motors Self Start, induction 200/250 volts, 50 cycles, 1-phase, 1,425 r.p.m., ¼ h.p., £4 2s. 6d., 1/3 h.p., £4 19s. 6d., ½ h.p., £6 18s. Perfect and guaranteed. Carriage extra.—JOHNSON ENGINEERING COMPANY, 319, Kennington Road, S.E.11. Reliance 1412/3.

GENERAL

Air Compressors, tanks and accessories at far below list, from £5 17s. 6d., TV and lighting generator from £15.—TEDDINGTON ENGINEERING CO. LTD., 29-31, High Street, Teddington, Middx. Tel.: Kingston 1193.

Spraying Handbook, 3s. 10d., post free. Paints, cellulose and allied spraying sundries. Catalogue, 2½d.—LEONARD BROOKS, 25, Oak Road, Harold Wood, Romford.

Guaranteed! Easy Home Constructed Refrigeration. Genuine domestic components. Not secondhand ice cream scrap. Modern hermetic G.E.C. units, gas, electric and oil silent unit. Everything for refrigeration. Complete specialists. Send s.a.e. for free illustrated "Sealed system" leaflet or 1s. for complete catalogue (refunded with first order).—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Phone: Wallington 9309.

Compressors for Sale. Twin piston with tank, 2½ cu. ft. per min., £4. Single cyl., £2. All types motors. S.A.E. for list. —WHEELHOUSE, 13, Bell Road, Hounslow. 'Phone: HOU 3501.

Build Your Own Refrigerator. Everything to make built-in or cabinet refrigerator, S.A.E. for sealed unit list and schematic diagram or 1s. (refundable) for 32 page catalogue including details of free 4 cu. ft. cabinet diagram offer. Hire purchase available.—WHEELHOUSE, 13, Bell Road, Hounslow. 'Phone HOU 3501.

Work Wanted. Turning, capstan milling, grinding, shaping. Fully equipped works in heart of London. Single or long runs.—BELL & SMART, 48-50, Tottenham Street, W.1.

Learn It As You Do It—We provide practical equipment combined with instruction in radio, television, electricity, mechanics, chemistry, photography, etc. Write for full details to—E.M.I. INSTITUTES, Dept. ME47, London, W.4.

Unowot Whiston's Sell. S.A.E. catalogue.—K. R. WHISTON (Dept. M.E.S.) New Mills, Stockport.

Young & Son. Material and tool dealers, watch, clock and jewellery repairers.—133, London Road, Chippenham, Wilts.

Illustrated Catalogue No. 13. Containing over 450 items of Government surplus and model radio control equipment, 2s. 2d. Refunded on purchase of goods, 2s. 6d. overseas seamail.—ARTHUR SALLIS RADIO CONTROL LTD., Department M.E., 93, North Road, Brighton.

Aqualung and compressor equipment.—PRYCE, 157, Malden Road, Cheam.

Bumble Bee & Busy Bee, 50 c.c. auxiliary engines by Edgar T. Westbury. Send s.a.e. for list of our super-castings and all accessories for these engines.—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Telephone: Wallington 9309.

Wanted. Traction engine in sound working order. Fullest particulars to—J. O. C. SAMUEL, Greywood, Burwood Park, Walton-on-Thames.

Bright and Black Mild Steel and brass. Large stocks, wide range, low price, quick delivery. S.A.E. for list.—B. J. HARRIS, The Cottage, Corngreaves Hall, Cradley Heath, Staffs.

Wanted. 5-ton Steam Tractor, any make considered.—Box No. 8630, MODEL ENGINEER Offices.

Model Maker with ML7 willing to undertake machining, own material or material supplied. Estimates given.—JOHNSON, 9, Longbourne Green, Farncombe, Surrey.

Wanted. Antique Weapons, pistols, revolvers, blunderbusses, daggers, gunpowder flasks, bullet moulds, etc.—DENNIS, 28, Langley Road, Slough.

Light Precision Turning, Fitting and Assembly Work Wanted. Production, experimental or prototype and complete mechanisms. Prompt delivery, moderate charges.—CANONBURY ENGINEERING CO., 283, Essex Road, London, N.1. Can 6256.

Steam Cars, boats and small stationary power units are described in "Light Steam Power." Your copy and comprehensive illustrated lists of drawings, including Light Steam Car Power Unit, and castings for 3s. 8d.—LIGHT STEAM POWER, Kirk Michael, Isle of Man, U.K.

Two Diesel Engines (reconditioned), E.D. 2.46 c.c. racing engine, £2. Allbon Spitfire 1.c.c., 35s.—R. S. MARSHALL, Glenwhommie, Dunblane, Perthshire.

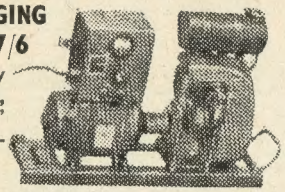
Galloping-Horses Roundabout. Special photographs for model makers, set (nine), 5s. Blueprints, 10s. set.—MURDOCK, 74, Blackborne Road, Dagenham, Essex.

Wanted. Plain Precision Bench Lathe 2½″ to 4″ centres. Particulars to—MOORE, 11, Gordon Terrace, Southbourne, Emsworth, Hants.

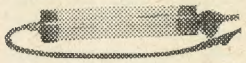
Leominster, Herefordshire. Two semi-detached houses (one with vacant possession), well built, red brick with slate roofs, each containing 3 bedrooms, bathroom, h. and c., lounge, dining room, spacious kitchen, spacious and well ventilated cellar, outside w.c., garden shed. Highly productive flower and veg. gardens. The one with vac. possess. has a first-class garage-cum-workshop—brick and tile, well lit and over 25′ long (£4,500). —Box No. 8651, MODEL ENGINEER Offices.

WATSON'S SPECIAL OFFERS

J.A.P. 14/32 V 288 CHARGING SETS £17-10-0. Carr. 17/6



These are very beautifully made sets each slightly used, tested and with three months' "SAME-AS-MAKERS" Guarantee.



AIR DRIERS. Approx. 15 in. overall, 2½ in. dia. with 2 ft. rubber tubing. Extremely useful where supply of dry clean air is required. New and boxed. **8/6**, post 2/6. **SILICA GEL** for use with above, **1/6** per tin, post 1/4.

Hundreds of other bargains available. Send 6d. stamp for monster list.

EASTERN MOTORS, ALDEBURGH, SUFFOLK Phone 51

The ANNUAL SUBSCRIPTION to

MODEL ENGINEER

Published every Thursday, it is obtainable from local newsagents or direct from the Publishers by subscription.

(U.S.A. & Canada $8.50) **58/6** post free

Percival Marshall & Co. Ltd · 19-20 Noel St · W1

STEAM ENGINE BOOKS

CHRONICLES OF A COUNTRY WORKS, *by Ronald H. Clark, A.M.I.Mech.E.* The story of "Burrells of Thetford." The growth and development of this world famous family business which was responsible for making the first portable engine (in 1848) and the first heavy duty steam road haulage engine (in 1856). This notable book gives details of almost every Burrell engine ever made—and there are nearly 4,000 of them. There is also a very fine collection of drawings and old prints. 328 pages, 167 plates and figures. **63s.**, post 1s. (U.S.A. and Canada $12.50, post paid).

STEAM ENGINE BUILDERS OF SUFFOLK, ESSEX AND CAMBRIDGESHIRE *by Ronald H. Clark.* A history of the steam engine trade in the counties of Cambridgeshire, Essex and Suffolk lavishly illustrated with 100 photographs and drawings. The author carried out considerable research among a large number of firms to obtain data on all the various types and makes built during the past 150 years. Illustrations range from old prints salvaged from ancient catalogues to photographs of the latest modern machines, and there are numerous anecdotes, stories, adventures and data contributed by engine drivers, draughtsmen, directors and proprietors of the firms concerned. 141 pages. **6s. 6d.**, post 8d. (U.S.A. and Canada $1.75, post paid).

STEAM ENGINE BUILDERS OF LINCOLNSHIRE *by Ronald H. Clark.* A companion volume to *Steam Engine Builders of Suffolk, Essex and Cambridgeshire.* This book represents the history of thirty engineering companies in Lincolnshire, recording the vicissitudes of the firms and their founders and describing the characteristics of numerous types of engine, including many unusual designs. A feature of the book are the numerous illustrations, which, where possible, are the original catalogue blocks or reproductions of them. 150 pages, 141 illustrations. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid).

From your bookseller or

PERCIVAL MARSHALL, 19-20, Noel Street, W.1

Model Engineer

CLASSIFIED ADVERTISEMENTS

- PRIVATE RATE **3d.** A WORD
- TRADE RATE **6d.** A WORD
- MINIMUM 12 WORDS
- BOX NUMBER 1/- EXTRA

To "MODEL ENGINEER" Classified Advertisement Dept., 19-20, Noel Street, London, W.1

Please insert the advertisement below under

heading.....for.....insertions

Name .....

Address .....

Name and address, if to appear, must be paid for.

Three insertions for the price of two. ★ Private advertisers only.

Please write in block letters. REMITTANCE VALUE ..... ENCLOSED

Printed in Great Britain for the Proprietors by Electrical Press Ltd., Cordwallis Works, Maidenhead, Berks, and published by Percival Marshall & Co. Ltd., 19-20, Noel Street, London, W.1.
Registered for transmission by Magazine Post to Canada including Newfoundland.

ME QUERY COUPON OCTOBER 1957

3/4" Scale "Royal Scot" Castings

Set of Drawings 39/6

CASTINGS

Driving wheels	4/6 ea.	Bogie horns	1/- pr.
Bogie wheels	1/9 ea.	Main horns	1/6 pr.
Tender wheels	2/3 ea.	Bogie hanger bracket	1/6 pr.
Cylinder body	25/- ea.	Main axleboxes	3/6 ea.
Cylinder valve liner	4/6 pr.	Bogie axleboxes	2/6 ea.
Cylinder back cover	3/9 ea.	Motion plate	3/- ea.
Cylinder front cover	2/9 ea.	Valve gear bracket	4/- pr.
Cylinder steam chest cover	2/6 ea.	Steps, loco and tender	3/9 ea.
Cylinder glands	2/6 pr.	Front steps, loco	2/6 ea.
Buffer stocks	1/3 ea.	Tender horns	1/3 pr.
Main stretcher	14/6 ea.	Tender axleboxes	3/- ea.
Motion plate stretcher	2/9 ea.	Tender buffer blank	3/- ea.
Buffer plank angles, inside	3/- ea.	Tender dummy springs	1/9 ea.
Buffer plank angles, outside	3/- pr.	Smokebox barrel ring	10/- ea.
Drag plate	10/- ea.	Smokebox support	9/- ea.
Bogie pin stretcher	4/- ea.	Smokebox door and ring	9/- ea.
Bogie stretcher	4/6 ea.	Funnel	5/- ea.
Bogie equaliser spring	1/6 ea.	Petticoat	8/6 ea.
		Dome	4/9 ea.
		Splashers	2/6 ea.

All Prices Plus Packing and Postage.

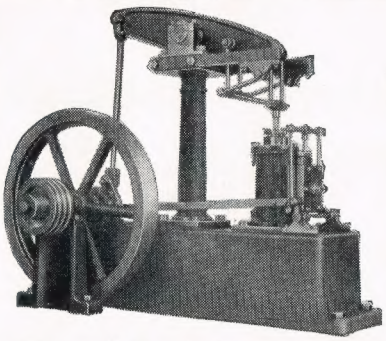
Bond's Model Catalogue. Price 2/-.

Bond's Gear, Tool and Material Catalogue. Price 1/9.

Bond's O' Euston Road Ltd

357, Euston Road, London, N.W.1

Est. 1887. Phone: EUSton 5441-2



Why a BEAM ENGINE?

Because it is a fascinating engine to watch in motion. Every moving part (except the Slide valve) can be seen and Watts' Parallel motion is of never failing interest. Because it runs slowly, it only needs a quite small boiler. It is one of the Simplest engines to build.

Complete set of castings and all materials

£3 17s. 6d.

Including postage & Purchase Tax £5

Abroad: there is no Purchase Tax

Our catalogue is **1s.** post free.

STUART TURNER LTD

HENLEY-ON-THAMES, OXON

PLANS OF FAMOUS SHIPS

We specialise in really authentic plans of famous ships, both Sail and Power. These drawings are suitable for the construction of first-class scale models—not toys.

Fully illustrated catalogues can be supplied as under:

SAILING SHIP 1s. 6d. POWER CRAFT 6d.

(post free)

Available from all leading dealers in Model Supplies or

Holborn Drawing & Tracing Co.

60-62 Queen Elizabeth Avenue, HILLINGTON, GLASGOW, S.W.2

FREE TO AMBITIOUS ENGINEERS!

THIS 144-PAGE BOOK

Full details of the easiest and quickest way to prepare for **A.M.I.Mech.E., A.M.S.E., City & Guilds (Electrical, etc.), L.I.O.B., Gen. Cert. of Education, etc., on "NO PASS NO FEE"** terms. This valuable Guide outlines the widest range of Home Study Courses in all branches of Engineering—**Mechanical, Electrical, Civil, Aero, Auto, Radio, Television, Chemical, Gas, Building, Production,** etc, and is full of helpful information. If you are earning less than £18 a week you cannot afford to miss reading "ENGINEERING OPPORTUNITIES." Send for your copy today—FREE and without obligation.

B.I.E.T., 13A, COLLEGE HOUSE, 29, 31, WRIGHT'S LANE, LONDON, W.8

THE B.I.E.T. IS THE LEADING INSTITUTE OF ITS KIND IN THE WORLD

SEE OUR CATALOG

OF

AMERICAN LIVE STEAM LOCOMOTIVES

— NEW PICTURES — NEW IDEAS —

Get this book on our popular locomotives, some of which you can practically "Bolt Together"—we do the lathe and mill work.

OLD TIME AND MODERN ENGINES, CARS, EQUIPMENT CASTINGS, RAIL, SUPPLIES

Everything for building Live Steam Locomotives 1", 1½", 2", 3", 4", 7" and 10½" scales.

Send 50c. (4s.) to-day for our 100 page catalog

LITTLE ENGINES—BOX K—LOMITA, CALIF., U.S.A.

PRECISION GEARS

Spur Gears — 24-100 D.P.
Bevel Gears Mitre & Ratio,
Worm Gears and Reduction Boxes,
Crossed Helical Gears — Racks,
Ground Shafting — Collars — Ratchet Wheels.

Send for complete list. *Phone* 20231-2

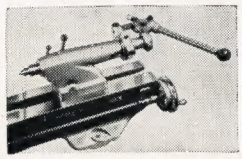
Made by *S. H. Muffett, Ltd.* Estd. 1920

PRECISION PRODUCTION ENGINEERS

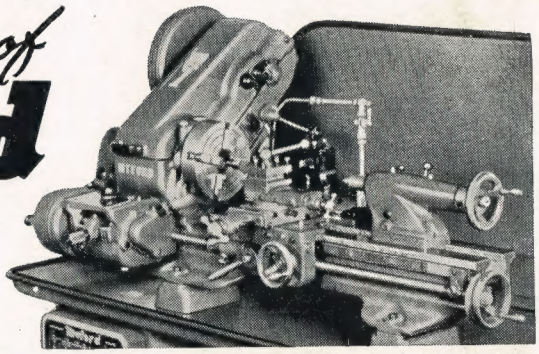
Mount Ephraim Works, Tunbridge Wells

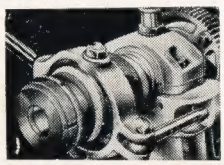
Double the usefulness of your Myford

with these handy attachments!

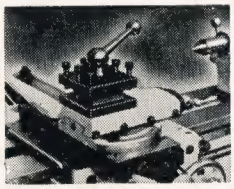


1640. Lever operated tailstock attachment

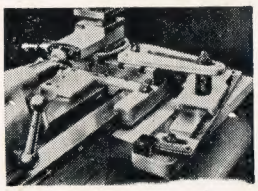




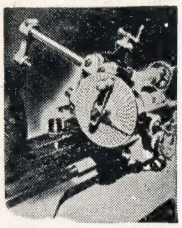
1611. Lever operated collet chuck: ¾ in. capacity. Additional collets, style 1027



1410. Four tool turret, takes ⅝ in. sq. cutter bits



1629. Taper turning attachment, slide base 9 in. long, working length 6 in., angular movement 10° either side of zero



2A 1495. Dividing attachment (with two division plates)

MA68/1. Vertical slide, swivelling type

Many awkward jobs are within your easy reach, thanks to the range of over 50 Accessories provided by our factory. Careful thought, and research into the needs of the most exacting user, has produced a series of easily fitted, precision-made extras. Send to-day to DEPT. 10/42 for fullest details.

MYFORD ENGINEERING CO. LTD., Beeston, Notts., England Phone: Beeston 25-4222 Grams: Myford, Beeston, Notts

Myford

"ZOE"

in gauge 1

designed by

"L.B.S.C."

"Reevesco" castings—used and approved by "L.B.S.C."—enjoy a world-wide reputation. A 6d. stamp will bring you a copy of our latest lists of blueprints, castings and materials for many "L.B.S.C." designed small steam locomotives. Workshop equipment, etc.

FRAME STEEL	... 3/6
BUFFER BEAM ANGLE ...	... 1/9
MAIN HORNS	... 14/-
MAIN AXLEBOXES	... 8/-
DRIVERS ...	... 7/4
PONY STAY	... 2/6
PONY WHEELS	... 4/-
PUMP AND STRAP ...	... 3/6
CYLINDER CASTINGS	... 29/-
MOTION BRACKETS	... 5/-
CROSSHEADS	... 2/6

Postage extra.

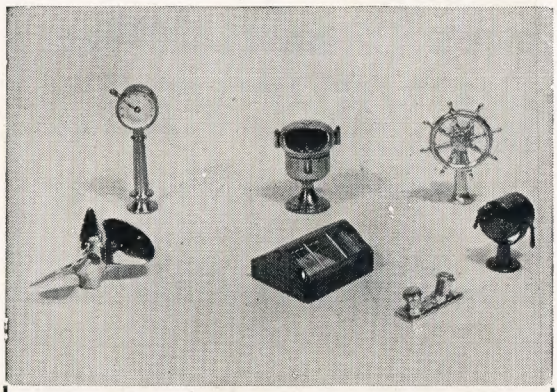
Any item of workshop equipment, large or small, is available on our well-known Out of Income Terms; detailed quotation with pleasure, quite free of obligation.

"THE CHOICE OF EXPERIENCE"

A. J. REEVES & CO. (Birmingham) LTD

416, MOSELEY ROAD, BIRMINGHAM, 12

Telephone: CALthorpe 2554



WEB

OUR No. S412 Best Union Silk Sailcloth approx. 32" wide is now 8s. per yard plus post.

Rigging Cord best quality, five sizes obtainable.

The sign of quality

Our fully illustrated catalogue, 48 pages of "WEB" Model Productions, faithfully reproduced from the actual models. Well over 1,000 sizes to choose from. Price 3/-.

Whether you require fittings for Yachts, Sailing Ship, Launch, Liner, Naval or Marine, our excellent productions are produced to give you entire satisfaction at a reasonable price. If you have difficulty in obtaining our products, send your order to our works. We regret that NO enquiries can be answered unless a stamp is enclosed for return postage.

THE WEB MODEL FITTING CO.

204, High Road, Wood Green, London, N.22, England